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AUTHOR	Tweeten, Luther, Comp.
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ABSTRACT

The series of papers grew out of a Rural Economic Development Planning workshop conducted on the Oklahoma State University campus, July 1971, for personnel in agencies actively engaged in applying and disseminating rural development research. The first four papers supplied basic information to workshop participants: Rural development was defined in the first paper as increasing the well-being of rural people wherever they eventually resides; the second paper covered channels of communication through rural institutions and organizations: A tool for measuring and monitoring rural economic progress was introduced in the third paper; feasibility studies on the how and why of plant location were the topic of the fourth paper. The next three papers covered the impact of industrialization on rural areas and communities; papers 8-13 gave specific examples of community services which contribute to the well-being of rural residents. Papers 14-17 introduced the ideas and problems of planning at state and local levels. The last paper is significant in that it tells change agents how to communicate planning ideas, since the research results contained in the first 16 papers are useful only if they can be communicated through the change agent. Perhaps the most important result coming out of this type of workshop, however, was the stimulation of a continuing research of rural development problems. (KM)

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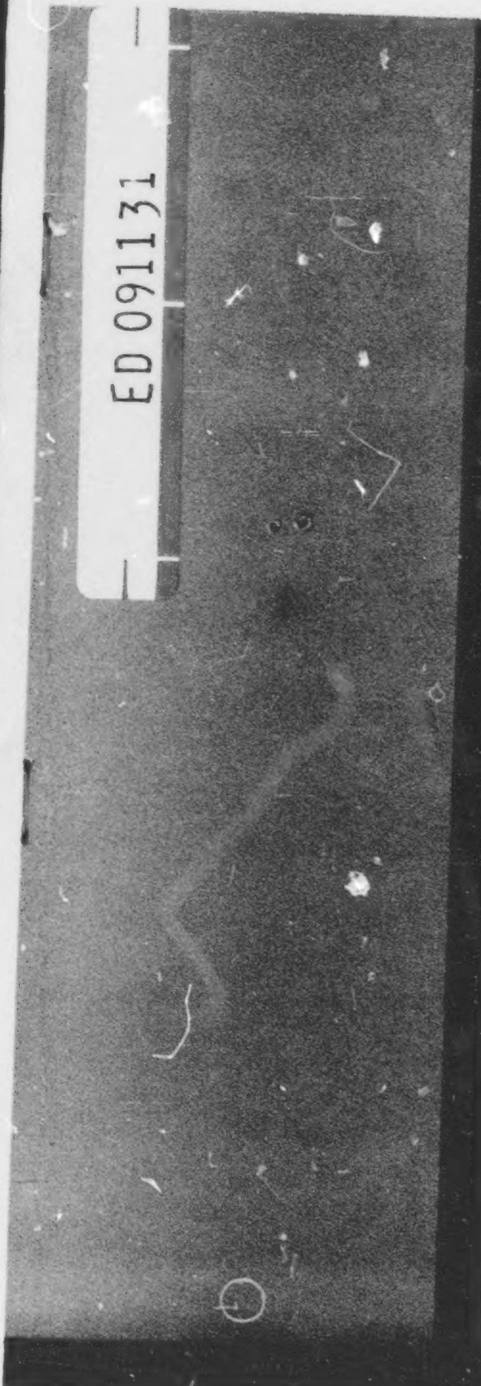

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Research Application In Rural Economic Development And Planning

Luther Tweeten, Comp.

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Research Report P-665

July 1972

RC 007895

OKLAHOMA STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION

PREFACE

The following series of papers grew out of a Rural Development Planning workshop conducted on the OSU campus July 12-23 of 1971 for personnel in agencies actively engaged in applying and disseminating rural development research including Cooperative Extension Area Development Specialists, County Extension Directors, community development specialists in various USDA and state government agencies, Vocational Agricultural Instructors, and graduate research assistants. The workshop presented a challenge to research staff in the Department of Agricultural Economics who were working in rural development to take their research results and formulate real world applications to problems faced by action agencies. Results expressed in this publication verify a measure of success.

The first four papers supplied some basic information to the workshop participants. Rural development was defined in the first paper as increasing the well-being of rural people wherever they eventually reside. Problems and potentials of rural areas were discussed in bringing about this increase in well-being. Rural institutions and organizations are the main arm in realizing rural development objectives. Channels of communications through these institutions and organizations is the topic of the second paper. A tool for measuring and monitoring the economic progress of rural areas was introduced in the third paper. An economic base study is vital to the application of much rural development research to actual areas. Feasibility studies are the how and why of plant location and is the topic of the fourth paper. It also introduces the subject of the next three papers on the impact of industrialization on rural areas and communities.

A specific example is given for measuring the gains (or losses) to a community from industry location. Not all communities may benefit from a firm moving into their area but actual research results in Eastern Oklahoma show substantial community net gains from industry location. Intercommunity and intercounty linkages also indicate a spread effect from industry locating in one community but with benefits accruing in other communities.

Papers eight through thirteen give specific examples of community services which contribute to the well-being of rural residents. The economics of providing the services of education, health, solid waste disposal, water systems, and retail and business services are discussed in these papers. Population density presents unique problems in providing quality services to rural people.

Papers fourteen through seventeen introduce the ideas and problems of planning at the state and local levels. The last paper is significant in that it tells change agents how to communicate planning ideas. The research results contained in the first sixteen papers are useful only if they can be communicated through the change agent.

Perhaps the most important result coming out of staging a workshop of this type has been to stimulate a continuing research of rural development problems. The thirty-two workshop participants from Oklahoma and four other states provided valuable feedback to the material presented by the workshop staff. Subsequent to this workshop, more research results and further application to rural development problems have been generated by the department.

Special recognition is extended to a series of seminar speakers whose presentations were not captured in written form but were greatly appreciated by the participants and workshop staff. They included Jim Dawson, Director, Office of Community Affairs and Planning; Dr. Lynn Daft, Assistant Deputy Administrator, Economic Research Service, USDA; Ralph Rhodes, Co-Chairman, Ozark Regional Commission; Bill Accola, Supervisor of Academic Computing Services, OSU; and Dr. George Abshier, Director, Community and Industry Programs, OSU Extension.

Workshop staff is recognized in this publication through authorship of the individual papers. Needless to say, there would not have been such a workshop without the extensive use of their time.

James S. Plaxico, Head
Department of Agricultural
Economics

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ELEMENTS OF ECONOMIC GROWTH IN RURAL AREAS

Luther Tweeten[*]

Many of us participating in this development workshop began our careers working principally with farmers to improve their economic position and well being. There is growing recognition that we need to serve the entire rural community. My presentation provides an overall view of the major elements underlying rural development. It is a look at the forest rather than the trees--later presentations will deal with the "nuts and bolts" of providing rural services and planning for area growth. You may not be able to apply directly the issues I discuss, but these issues should be in your mind as you pursue the day-to-day chores of rural development.

Before discussing elements and theories of economic growth in rural areas, it is useful to review some of the socio-economic characteristics of rural farm, rural nonfarm and urban residents of Oklahoma.

THE OKLAHOMA RURAL ECONOMY

The definition of "rural" is arbitrary. Some define rural to encompass all persons living outside Standard Metropolitan Statistical Areas (essentially cities of 50,000 or more). By this definition 56 percent of the state's population was rural in 1960. A more frequently used definition of rural, the one used below, is open country and towns of 2,500 or less. By this definition 864,000 persons or 37 percent of the state population was classified as rural in 1960. And 819,000 persons or 32 percent of the state population was classified as rural in 1970. Rural nonfarm residents comprised 26 percent and rural farm residents comprised 11 percent of the state population in 1960, hence there were more than two rural nonfarm residents for each farm resident. While the farm population has been declining, there is evidence that the rural nonfarm population is growing. Many farm people are moving to small towns either to retire or to reside while commuting to their farm to carry on farm operations. And many urban residents are moving to rural towns to live while commuting to jobs in large cities.

Few data are yet available on the rural-urban breakdown from the 1970 census, but some indication of rural-urban differences and the problems of rural areas can be gained by comparing data for the 15 counties of the state which had no urban residents (no cities of 2,500 or above) with data for the most urban counties, Oklahoma and Tulsa. Only four of the 15 rural counties gained population between 1960 and

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[*] Regents Professor, Department of Agricultural Economics, Oklahoma State University.

1970. The gains in these four more than offset losses in the other counties, and the total population of the 15 rural counties increased 1 percent. In contrast, the population of Tulsa and Oklahoma counties rose 16 and 20 percent, respectively. Two-thirds of the towns with a population under 1,000 in 1960 grew in population from 1960 to 1970. However, the total number of persons residing in these 360 towns fell four percent in the decade. The same percentage of towns with 1,000 to 2,500 residents in 1960 grew in the decade, but, in contrast to smaller towns, they experienced a net population gain of 17 percent. The overall population gain was the same in percentage terms for towns of 2,500 to 10,000 population, although a lower percentage, 53 percent, of these grew in population.

Selected characteristics of Oklahomans by place of residence in Table 1 point to serious economic problems for rural residents. Measured by income, poverty, schooling or labor force participation, rural farm and nonfarm characteristics are similar, and both rural components contrast sharply with urban. Median income of urban families exceeded that of rural families by approximately $2,000. The incidence of poverty was at least 20 percentage points higher among rural than among urban families. Median schooling completed was nearly three years less for rural than for urban residents. A substantially higher proportion of urban residents was in the work force.

Table 1. Selected characteristics of rural and urban residents of Oklahoma, 1960

	Urban	Rural	
		Nonfarm	Farm
Median income of families ($)	5,303	3,467	3,361
Proportion of families with incomes under $3,000 (%)	23	44	45
Median school completed (years)	11.6	8.8	8.9
Proportion age 14 and over in labor force (%)	35	22	19

Table 2, utilizing the rural-urban county statistical dimension, again highlights the disadvantaged economic position of rural residents compared to urban residents. The 15 most rural counties displayed lower median income and schooling and much higher incidence of poverty than did the two most urban counties. There was little difference between urban and rural counties in unemployment, measured as the percent of persons in the labor force seeking work. But underemployment, measured by the proportion of the potential labor force not utilized, was 3-4 times higher in the rural than in urban counties. The rural-urban difference in underemployment is explained by rural workers becoming discouraged and dropping out of the labor force or accepting employment in jobs that do not fully utilize their earning capabilities. Outmigration of productive age groups and low work force participation explain the high dependency (nonworker-worker) ratio in rural counties. This statistic points to problems in supporting adequate schools for the young and social services for the old by a comparatively small proportion of persons in the productive working age category. The incidence of persons receiving public aid was nearly three times as high in the rural as in the urban counties. The high proportion of persons in older age categories points to the need for medical and hospital facilities in rural counties. Yet two measures of services, the number of physicians and hospital beds, indicated that the rural counties had inadequate health facilities. Clearly, a strong program of research and action is essential to deal with problems of rural areas and to promote rural development.

Table 2. Selected characteristics of the 15 totally rural counties and the two most urban counties in Oklahoma, 1960.

	Fifteen Most Rural Counties	Two Most Urban Counties	
		Oklahoma	Tulsa
Median family income ($)	3,513	4,717	4,931
Proportion of families with incomes under $3,000 (%)	24	13	12
Median school completed (years)	9.3	12.1	12.1
Unemployment (% of labor force)	4.2	3.1	4.5
Underemployment (% of labor force)	29.3	9.8	6.4
Nonworker-worker ratio	2.0	1.4	1.5
Proportion of population receiving public aid (%)	8.9	3.4	3.0
Residents per physician[1/]	2,009	647	638
Residents per hospital bed[1/]	240	184	185

[1/] 1970 data.

ELEMENTS OF AREA ECONOMIC GROWTH

Defining Economic Growth

Economists usually define economic growth in theory as an increase in the well-being of people and in practice as an increase in income. With growing recognition of environmental problems and poverty, concern extends beyond total real income to the quality of life and the distribution of income. Ideally, economic growth should measure the well-being of people, including the quality of housing, community services, roads, clean air and water, and access to employment opportunities and services as well as total dollar income. And it is the level of these for each person that counts. An area can experience economic growth per person while the total population and even total area income decline. Economic development should be concerned with improving the well-being of people in an area, wherever they eventually reside. Thus a community needs to be concerned about maintaining quality schools even if graduates leave the community.

Problems such as air and water pollution, traffic congestion, crime and drugs frequently associated with urbanization are turning the attention of many rural people from population growth as an end in itself. People increasingly recognize the value of open spaces and clean air. But rural people cannot turn their backs on economic growth because without it they will be unable to provide even minimum adequate community services and personal amenities that are now much a part of our society.

Some definitions of economic development can mislead efforts to promote the well-being of rural people. One prestigious national committee defined community resource development as " . . . a process whereby those in the community arrive at group decisions and take actions to enhance the social and economic well-being of the community." This definition makes the process rather than the well-being of the community the objective of development. When the process becomes an end in itself rather than the means toward development, then activity focuses on organizing the community rather than on obtaining tangible results. Economically depressed communities which have seen past community efforts toward development fail can be made even more pessimistic and alienated by another development effort that concentrates on the process itself and that does not result in higher levels of living.

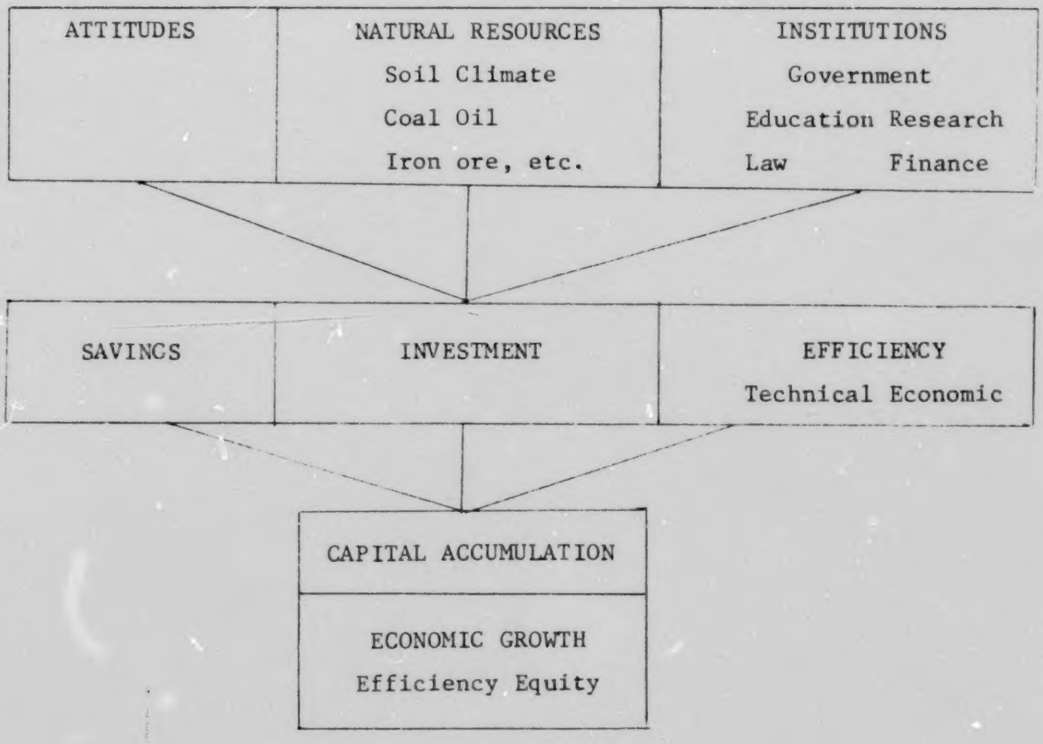
Communities must vigorously use local initiative and organization to promote development, but that effort must look outward as well as inward. Looking inward means getting the most out of local resources. Looking outside the community means moving people to jobs and jobs to people. Communities need to use local, state, and federal resources to build adequate school, water, or sewer systems--there are not enough local resources to provide adequate services.

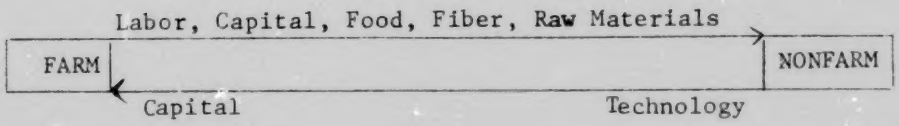
Ingredients for Area Growth

Before examining some specific theories, it is well to examine the basic ingredients of economic growth: natural resources, institutions and attitudes of people (Figure 1). Perhaps the most important ingredient is attitude. Israel with a "sand pile" and Japan with a "rock pile" have demonstrated that a high standard of living is possible without a rich endowment of natural resources. There are two important dimensions of attitudes. One is that people constitute a dedicated, conscientious, hardworking labor force, willing to forego current consumption for future gain. The other is that people must be good judges of investment opportunities and be eager to take reasonable risks with their energies and capital to pursue economic gains. The attitudes of people also influence their institutions. Institutions such as government must help provide the atmosphere of stability, freedom, justice,

Figure 1

ECONOMIC GROWTH


ATTITUDES
NATURAL RESOURCES
Soil Climate
Coal Oil
Iron ore, etc.
INSTITUTIONS
Government
Education Research
Law Finance
SAVINGS
INVESTMENT
EFFICIENCY
Technical Economic
CAPITAL ACCUMULATION
ECONOMIC GROWTH
Efficiency Equity


Labor, Capital, Food, Fiber, Raw Materials
FARM
NONFARM
Capital
Technology

and security required for people to realize their potential contribution to economic progress.

Attitudes, basic resources, and institutions influence savings, investment and efficiency. If people immediately consume all they produce, there is no human and material capital formation and no economic growth. Farmers have typically saved about one-third of their incomes, and this has helped to create capital. If nonfarmers, who on the average save less than one-tenth of their incomes, saved at the same rate as farmers this nation would have a high growth potential indeed! But savings is not enough--burying ones nest egg in a mattress does not raise income. Savings must be invested to produce future earnings. Investment too is not enough as anyone has discovered who invested in a business that went broke. Savings must be invested efficiently--in activities and enterprises with a high payoff or rate of return. This efficient investment need not be in land, buildings, and machinery. Some of the most efficient investments are made in people and techniques. Studies reveal that the rate of return on investments in agricultural research have averaged about 50 percent and on investments in general and technical education have averaged about 10 percent. The rate of return on investment in these nonconventional inputs can be as high or higher than returns from investing in conventional items such as farm machinery or a clothing plant. Similarly, investment in community services can contribute as efficiently to economic growth in a community as investment in a new factory.

Savings invested efficiently lead to human and material capital formation which provides more income from which further savings can occur. This cycle of economic growth is strengthened by opportunities for specialization and economies of large size. Economic growth in the farming industry freed labor, food and fiber for use in the nonfarm sector. The nonfarm sector in turn used these to supply the nonfarm sector with more labor, food and fiber. This cycle is characteristic of the growth process and occurs at the community as well as the national level.

There are differences in the growth process of a region and the nation, however. A region which possesses favorable investment opportunities can bring in relatively more investment and savings from outside than can a nation. It also can bring in relatively more entrepreneurship to discover and carry through investment opportunities. But experience has shown that a rural area or region is likely to be most successful in its development efforts if it possesses the characteristics discussed above of high savings, investment, and efficiency.

THEORIES OF AREA ECONOMIC DEVELOPMENT

Economists put forth several explanations of why area economic growth takes place. Several of these theories or explanations are listed below. No one theory is comprehensive, and each has some truth. We can learn something from each theory.

Classical Economic Theory

Classical economic theory stresses that area growth is determined by rate of return on investment and by wage rates. Capital is attracted to areas where low capital-labor ratio results in high rates of return on investment. And labor is attracted to areas where a high capital-labor ratio results in relatively high wage rates. Account must be taken of the quality of labor--low wages may not attract capital or induce outmigration because of inadequate investment in the human agent. This failure to provide adequate general education and skill training explains why chronic low wages and earnings characterize some rural areas. The classical theory also gives inadequate emphasis to the importance of community services and housing in attracting jobs. Finally, even if people are moving out and capital is moving in to raise per capita earnings in an area, the process may be too slow and needs to be speeded. Other theories help to explain how the process can be hastened.

Basic Resource Theory

Basic resource theory emphasizes that area economic growth depends on the presence and development of local basic or natural resources--land, water, minerals, and climate. The primary industries such as mining, agriculture, and manufacturing generate secondary and tertiary employment in retailing and service industries. These linkages are expressed by multipliers which quantify the relationship between the jobs (or income) created in the primary industry and those induced thereby in the secondary and tertiary industry.

Export Base Theory

Export-base theory places the emphasis for area growth on creation of industry which exports its products to outside areas. Such industries can take advantage of large outside markets and earn money from these markets to purchase goods and services from other areas. These export industries are likely to be the primary industries, hence the export and basic resource theories have much in common. I now turn to theories which recognize more explicitly the role of profits and institutions in promoting area growth.

Location Theory and Comparative Advantages

Location theory emphasizes the role of monetary factors such as cost minimization or profit maximization in the location of economic activity, given the location of markets and natural resources. The theory emphasizes that firms examine production and transportation costs, then locate plants where these costs are minimized. Or extending the analysis a bit further, they consider the spacial distribution of demand for their output, then locate plants where the difference between total costs and returns is highest--where profit is greatest. Or looking at the situation in another way, plants may locate at random, but only those plants are viable which are located in areas with a comparative advantage as measured by ability to make profits. Areas where profits are highest for an industry or community are said to have a comparative advantage. Location theory gives inadequate attention to the role of non-monetary factors and the human element in determining which areas will grow.

Tradeoffs exist between production costs and transportation costs. Transportation costs higher for area A than area B may be offset by willingness of laborers to work hard and accept low wages and of plant managers to use most efficient techniques in area A. Willingness to accept low wages can give some rural areas a comparative advantage.

Internal Combustion Theory

The internal combustion theory of area growth stresses that economic growth can be generated by internal forces other than the presence of basic resources. Among such sources of economic growth are technology, specialization, division of labor, economies of scale, and well-developed community services and facilities. For example, many of the most dynamic new industries require little transportation cost or natural resources. The fundamental requirement is often skilled labor and techniques. The technology-oriented electronics industries of California and New England are examples.

The attractiveness of the internal combustion growth theory is that, unlike the basic resource theory, the requirements for growth are not written in the stars. Growth can occur in any area or region and depends largely on the will of local people to create the kind of environment that attracts capital and labor. Much of the effort is likely to be geared toward creating export industries. If the region is large enough, however, the growth can largely occur internally, without major exports to finance imports from other regions.

External Combustion Theory

The external combustion theory places the stimuli for growth outside the natural resources or man-made efforts of the region. Growth is generated by stimuli from outside the region. Examples are such factors as luck or an increase in outside demand for goods produced in a region. It is likely, for example, that the economic configuration of regions in the U. S. would look quite different today if settlement had first been made in the West and then followed by a movement East. The regional economic pattern would also look quite different today had there been no Civil War, no automobile, or no cotton gin. The trouble with the external combustion theory is its fatalism-- a region can find few ways to self-determine its growth. However, the theory does point to a role for an "outsider" such as the federal government in development of areas that lack initial ingredients for growth from market forces. Military bases and other government supported facilities provide a huge source of employment and secondary economic activities.

Some Summary Comments

In summary, area growth is less tied to natural resources and is more dependent on technology and on the attitudes and skills embodied in people than in earlier times. Also it is recognized that the chance factor is highly important, with economies of size sufficiently prominent so that a region may possess a comparative advantage simply because it was developed first. A large city may grow because firms want to locate near other firms and near a large consumer market. Regional science suggests that future area economic activity will be less tied to the natural resource and export base but will be more dependent on community initiative, nearness to markets, conglomerate (size) advantages, and investments in education and research.

Industries such as health, recreation, insurance and government are growing rapidly and gaining in importance relative to agriculture and mining. The service industries frequently are skill intensive, and tend to locate in or near large population centers and where education levels are high. New York City and Washington, D. C., for example, have been favored by growth in service industries. But these two examples also illustrate that social problems frequently attend the big city that are not fully reflected in the internal accounts of the firm that locates there. As these external problems are made internal costs of firms through new taxes and laws, many of these firms will find small communities accessible to rural workers more advantageous.

We now turn to measures to generate area economic development, first under existing legislation and policies. Then we shall look at new policies required.

WHAT WE CAN CHANGE WITH CURRENT POLICIES

There are many things that can and are being done to achieve rural development given the existing public policies and available funds. These efforts will be discussed briefly before addressing issues of new national public policies needed to achieve satisfactory living levels for rural people.

Full Employment

A national full employment policy is the first essential to transform rural areas and achieve development. It does little good to talk about training rural people or moving them to jobs if jobs are unavailable. It also does little good to talk of massive new programs to bring industry to rural areas, if as in 1971, 25 percent of our current industrial capacity lies idle. Hopefully, factors inhibiting national full employment can be overcome without new legislation. Then more attention can be given to specific policies to develop rural areas.

Decentralizing Jobs: The Case of Government

Over one-fourth of the national increase in employment will occur in the government sectors in the 1970's. Regional offices for many state and federal agencies would serve the twin purposes of bringing government services to people and decentralizing jobs. Furthermore, the multiplier effect in a multi-county region with 250,000 to 500,000 population would add about 70 additional service jobs for each 100 jobs in government. In similar size regions, new employment in manufacturing or construction would add from 75 to 150 jobs in subsidiary and service employment for each 100 basic jobs, depending on the type of industry.

Planning and Community Development

Many things the rural people can do to improve their communities fall under the general category of better planning, organization, and group decision making. Planning can include rural zoning to improve land use, consolidation of schools, formation of volunteer organizations (for fire protection, recreation, ambulance service, economic base studies, and feasibility studies to determine growth opportunities) and (in liaison with professionals) securing loans and grants from federal and other funding agencies to improve educational, health, and other community services. Rural people are receiving a disproportionately small share of the benefits of numerous important manpower and community development programs.

With current institutions and resources, we can improve counseling and guidance for our young people, informing them of locations and occupations where job opportunities exist.

Technical assistance and loans (from the Farmers Home Administration and other sources) are available to improve sewerage and water systems and other services and housing in rural communities. Much can be done to improve the appearance of rural America and give mainstreet a "face lifting" through a local initiative at little cost. Much of the leadership for such actions can come through organizations with which you people are affiliated. The Extension Service is helping to form community development councils and provide them with professional advice in taking needed action. While local committees can do some planning and action, they alone cannot bring adequate levels of living to rural people. Outside funding and assistance in planning are essential. Much of the planning for rural development can best take place at a multi-county level.

PROMOTING DEVELOPMENT WITH NEW POLICIES

Current policies, though a start, are inadequate to bring satisfactory levels of living to rural areas. The necessary transformation requires new policies and new programs as well as local leadership.

Many of the old policies are fragmented, poorly funded, misdirected and inefficient, and therefore should be eliminated.

Bringing People to Jobs

The emphasis in past development efforts has been on bringing jobs to people. Insufficient attention has focused on improving policies to bring people to jobs. Studies of migration patterns indicate that the migration process in highly inefficient. People move to the city and back home again several times before finally settling down. Those who return home have often found their stay in the city unproductive because they could not obtain an adequate job, could not maintain continued employment, or, in general, were not prepared in terms of skill and background for life in the city.

To overcome this inefficiency in migration patterns it is necessary to improve human resources in rural areas. The resources are improved mainly through general education and through job training. Oklahoma has made considerable strides in recent years in expanding vocational programs.

People oriented development programs such as education and training have a high probability of success because they benefit the individual whether he leaves his home community or remains. Social rates of return on general education have been found to be quite high and generally range in the order of 18 percent rate of return on investment (public and private) in elementary schooling, 10 percent in secondary schooling, and approximately 10 percent in university schooling. Private rates of return on only the investment made by the individual are, of course, higher. Rates of return on vocational training have been found to be at least as high as those from general education.

A second priority for bringing people to jobs is to improve the functioning of labor markets. Studies of labor mobility indicate that most migrants depend on information from friends and relatives to learn about the availability of jobs. Many improvements need to be made in the public employment service to overcome deficiencies in labor market information. Some of these improvements include a greater effort to reach unemployed and underemployed people in rural areas. Another needed improvement is more information on within state as well as out of state job opportunities. The dissemination of this information and compiling of it can be greately improved if the employment services use modern electronic data processing techniques. More resources need to be put into the federal-state employment service to improve counseling and job information and to subsidize migration.

Bringing Jobs to People

The third priority for rural economic development is to put teeth in programs to bring more jobs within commuting distance of rural residents. Current programs of technical assistance and low interest loans are inadequate. It is not fair to ask depressed communities to subsidize locating industries even if it is profitable for these communities to do so. Not every community has an opportunity for economic growth and it may be necessary to concentrate public funds in viable cities that are large enough to have potential for sustained growth and that also are within reach of rural people--approximately a 50 mile radius of the center. A strong program of tax write-offs or other financial inducements to firms which locate in growth centers of viable rural districts is essential. One suggestion is that the tax write-off be proportional to degree of unemployment or underemployment in rural areas. A firm which locates in a designated growth center would write off from its corporate income taxes one percent of its plant investment for every one-half of one percent of underemployment in the development district. In other words, if underemployment is 30 percent in the district, then the firm can write off from its corporate federal income tax 15 percent of its investment in plant and equipment. This program would only be available to firms that locate where underemployment exceeds (say) 20 percent.

The policy may need to be accompanied by other policies to help the disadvantaged worker. The fact that the disadvantaged worker frequently found his move to a metropolitan area unsuccessful also suggests that the firm which locates in a depressed rural area may also find him a marginal employee. The result is that the least disadvantaged workers in the depressed areas are hired, and the disadvantaged workers are left behind. So incentives for firms to locate might be accompanied by incentives for the firm to train and employ the disadvantaged. Job Opportunities in the Business Sector (JOBS), a program utilizing federal funds to help private industry train and employ the disadvantaged worker, has proven to be very cost-effective--it requires few public dollars to create a new job.

A final priority for adequate level of living in rural areas is welfare reform to reduce the indignity of the means test, cut wasteful administrative apparatus, include built-in incentives for work and for family unity, reduce variation in payment rates and eligibility requirements among states, and reach more than one-third of the poor not receiving assistance. Welfare reform now before Congress goes far toward making needed reforms.

USING COST-EFFECTIVENESS TO SET PROGRAM PRIORITIES

Estimates of the efficiency of public monies in creating new employment opportunities are summarized in Table 3. The programs assume a reasonably adequate level of general education and no excessive national unemployment--thus general education and monetary policies are not included in the priorities. The table shows estimates of the cost to the public for creating a permanent job for residents of rural areas. It is apparent that public employment, which many people recommend as the solution to problems of underemployment in depressed areas, is a very expensive way to create new jobs. The net cost, of course, depends on the productivity of the workers involved in the program. If the workers are not productively employed, the cost is prohibitive. On the other hand, the JOBS program run by the National Alliance of Businessmen is a method of coupling the efficiency of private industry with the incentives provided by the public. Under this program, it has been estimated that the average public cost (federal subsidy per worker) to induce private industry to train and employ disadvantaged workers is only $3,000 per worker. The JOBS program perhaps has limited viability in many rural areas because there simply are not enough jobs available, but it is a way of focusing jobs directly on the most disadvantaged workers, and should be used wherever possible.

Table 3. Public cost for creating each new job for rural workers

	(Dollars)
Public employment ($5.000 per year for 10 years with 40 percent productivity)	30,000
Industry location through tax write-offs	10,000
JOBS program ($2,000 per job, two-thirds retention rate)	3,000
Subsidized migration ($500 direct payment plus $500 for administration and counseling)	1,000

Paying the Cost of Rural Development

The remaining question is, "Who will pay the cost for rural development?" The cost is already being paid by millions who have gone to the city unprepared by education and background for available jobs. The cost is already being paid by farmers and others in rural areas who are earning low returns on their resources. The cost is already being paid by metropolitan residents plagued with problems of air pollution, traffic congestion, crime and violence. Many of the costs associated with these problems do not enter the private accounts of firms making location decisions, hence firms find the metropolis profitable and jobs and people continue to flow in.

Others must pay the cost, including rural residents. The Governor of a large eastern state has said that federal government must spend $100 billion to rebuild central cities. Antipollution policies are attempting to make the metropolis more livable. Policies requiring use of nonlead gasolines and exhaust emission control devices presumably will apply to all residents, although air pollution is not a problem in rural America. Some crude calculations suggest that, despite few benefits, the cost to rural residents is large. If each nonlead gallon costs

2 cents more than current types of gasoline and reduces power by 5 percent, then the real price of a gallon of nonlead gasoline is 4 cents over that of current gasoline. If each car consumes 1,000 gallons per year, the additional cost per auto is $40 for gasoline plus perhaps $20 per year for the exhaust control device. If the cost, $60, is multiplied by 20 million cars owned by rural residents, the total annual cost to rural residents of controlling metropolitan smog is over $1 billion. Policies to develop rural areas and discourage further growth of the metropolis can be viewed as a social gain and not as a cost.

CONCLUSIONS

The attack on problems of rural areas must occur on several fronts. At the national level or front, the federal government must help provide funds for schools and welfare, since much of the benefits of these services accrue not to the local area or even the state but to the nation. New York City, for example, has directly had to bear much of the cost in city welfare for inadequate funding of welfare and schools in Mississippi. National policies to improve labor markets and to encourage decentralization are overdue.

At the town, county, or multicounty front on which most of you serve, the attack on rural problems takes a different form. On one local front are efforts to create new jobs through a local development corporation or through other means. Another front attacks problems through better decisions and plans for community development and services. Yet another front focuses on obtaining grants, loans, etc. from available federal and state sources or through local taxes to finance community improvements. Finally many of you are most directly involved with organizing local people and implementing action programs to improve solid waste disposal, install rural water systems or town sewerage treatment facilities. Progress in rural development needs to be made on all fronts, and research can help to make programs at the local, state and national level more effective and efficient.

Rural development entails strategies and tactics. Strategy encompasses issues of the appropriate level and mix of public policies. The tactics deals with implementation of policies. While you may agree or disagree with my conclusion that current national policies are inadequate, we may all agree that there is a need to get the most out of the policies now available through use of proper tactics at the district or local level.

COMMUNICATIONS IN ORGANIZATIONS

Ivan Hanson*

Each of us is a member of many organizations--work, social, religious or political organizations. Strangely enough, it is generally assumed that most people know how to function effectively and efficiently within these organizations with little formal attention to intricacies or organizational functioning. We graduate from high school and college with hours and hours of academic training in the specialties of a profession, but with no class time devoted to how we are going to apply those specialties within the organization that we join when we take a job.

The objective of this paper is to summarize some basic concepts of organization theory and communication patterns within organizations. Many readers will be involved in setting up organizations to do local planning or engage in other kinds of development activities. For these people, it is hoped that these principles will be helpful in creating the right kind of organization to meet this need; maybe new organizational forms such as the circle or star will replace the traditional hierarchy for some community projects. Other readers are already involved (some may feel overinvolved) in existing organizations that seem to be moribund and overwhelmed by the confusion surrounding inter-organization coordination. These people will be helped to understand why bottlenecks exist and what they can do about them. Some hints are included on how to manage the communication system, and, finally, some problems connected with planning organizations are discussed.

SCHOOLS OF THOUGHT

An organization is a collection of individuals, sharing the same objectives, who perform functions through interdependence within boundaries. The need for the study of organizations frequently arises from conflicts such as divergent objectives, or duplication of functions. Research and study of organizations is both old and new. Ancient history contains recommendations for organizing people, and yet many researchers continue to study them because of the difficulties of being specific about such a dynamic entity.

Current literature about organizations may be divided into three principal schools of thought: Classical, human relations, and modern [13]. The basic elements of each are summarized in Table 1. The classical school assumes that through selection, training or indoctrination; just treatment; and pay, or a combination, people can be brought to the point of filling the jobs exactly as specified in advance by the hierarchy. This is often thought of as the weakest point of the classical school and is the basis for the origin of the human relations school, which holds that individual attitudes and values, rather than the formal hierarchy, tend to shape working relationships. The modern school views

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*Associate Professor, Department of Agricultural Economics, Oklahoma State University.

Table 1. Schools of Thought in Organizations

	Classical	Human Relations	Modern
Also Called:	1. Machine Theory (People seen as machines) 2. Weber Model	1. Naturalistic 2. Neo-Classical	1. Open Systems 2. Contemporary 3. Professional Model
Source:	1. Max Weber 2. Frederick Taylor (Time & Motion) 3. Emerson 4. Henry Taylor	1. Hawthorne Studies 2. Likert (Participant Approach)	1. Miller (Systems Theory)
Assumptions:	1. Behavior of People Logical & Rational 2. Formal Organization 3. Hierarchy in Source of Authority 4. Order is Highly Esteemed 5. Rationality 6. Impersonality 7. Security 8. Goals are Equality 9. Man, Lazy, Irresponsible 10. Policy, Administrative Positions Separated	1. Individual Attitudes & Values in Conflict with Organization 2. Informal Organization Primarily 3. Elimination of Conflict a Goal 4. Reliance on Social Support 5. Utilizes some Behavioral Research	1. Looks at all interrelations "big Picture" 2. Informal & Formal Organization 3. Systems Necessary to Meet Objectives

organizations as systems of parts, each making a contribution to the overall organization, and each dependent on other parts of the organization. The sub-parts make individual adjustments to disturbances in the organization.

COMMUNICATION NETWORKS IN ORGANIZATIONS

Communication--the exchange of information and the transmission of meaning--is the very essence of a social system or an organization [10, p. 223]. The performance of functions within an organization depends on some form of communication, through the transmission either of energy or information. Thus, communication is an important part of understanding how an organization succeeds or fails in attaining objectives.

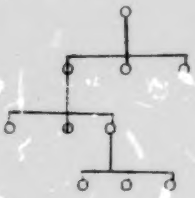
Followers of the classical school depend mainly on the formal structure of an organization to determine the direction and flow of communications. Such an organization frequently takes the structure of the traditional and familiar hierarchy, where the rules and duties of each slot are prescribed in advance, regardless of which person fills the slot. This type of structure gives rise to formal communications which are official organization charts, operating procedures, formal orders and directives, periodic reports, etc. Most formal messages flow vertically in the organization.

The introduction of individual attitudes and values by the human relations school made it important to understand the informal channels by which "subformal" communications flow. Subformal messages may flow along the formal channels or follow a purely informal, unwritten authority structure which exists in every organization. These messages tend to flow horizontally rather than vertically. The chief advantages of subformal channels is that unofficial messages can be altered without official record. Several generalizations can be made about subformal communications:

1. The greater the interdependence among activities, the more subformal will be the channels and messages;
2. Higher uncertainty in a bureau's functions will cause greater subformal channels and messages;
3. Time pressure increases the use of subformal communications;
4. Sections of the organization that are in strong conflict tend to communicate formally;
5. Subformal communication networks will be more effective if bureau members have stable relationships with each other and with external persons [4].

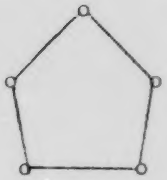
From these generalizations, it is evident that the structure of the organization affects the communication flow patterns and the communication patterns affect the structure of organizations. The most striking example of the latter situation is Burolandschaft. This technique originated in Europe and has recently been introduced into the United States. Office buildings are constructed without interior partitions, which are replaced by planters and eye level partitions. The purpose is to allow frequent rearrangement of personnel so that individuals and whole departments who communicate with each other frequently are located in close proximity. This flexibility allows for shifting goals and functions within the organization. It is the zenith of the situation where informal communications patterns determine the formal structure of the organization.

The patterning of the flow of information within an organization results in the delineation of a communication network. No one type of communication network is best for all purposes, and several patterns may exist within the same organization. Some are more appropriate for planning than for other tasks. The most common forms are:



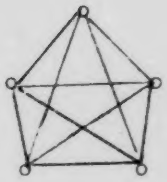
Hierarchy

Most widely used, classical, line organization
Clearly identifies superior authority
Downward flow of messages more frequent than upward flows
Messages flowing upward become distorted through filtering
Information received by top man is what subordinates want him to hear



Circle

Fosters "free flow" of information
Good for staff work



Star

Fosters "free flow" of information
Leads to information overload
Unlimited accessibility to all members
High redundancy
Fine for coordination, staff work

High distortion in messages
Restricted channels for information flow
Low accessibility to other members
No redundancy
Good for military action

Chain

For a planning group, the wheel or star pattern may be best. This is typical of a community planning council that has the responsibility for defining problems, developing goals, and other tasks that require a good deal of interaction among members of the organization representing a variety of publics. The assignment of data collection functions, clerical work, or other "leg" work may require the use of wheel or chain patterns to more efficiently assign tasks to be accomplished.

Communication Problems in Organizations

Managing an organization involves making decisions about the operations of employees. It also involves managing the communication flows which affect these decisions. Two principal communication problems that have to be dealt with in this context are distortion and overload [4].

Distortion

Persons at the top of a large hierarchy could not possible assimilate all of the messages that originate at the bottom of the hierarchy. One of the functions of the communications process in a bureaucracy is to condense the information that persons at the top of the heap have to assimilate; but in the process of reducing the quantity of messages, the quality is also affected. There is a tendency for intermediates to interpret messages as they are relayed because of self interest, perception of reality, current information, or identification patterns. Thus, distortion occurs.

Several anti-distortion techniques can be used by anyone within the hierarchy who wants to prevent this hangup. They are redundancy, counter-bias, eliminating middlemen, and distortion-proof messages.

Redundancy is the classic antidote, i.e., more than one channel is used to gather information. It may be gotten from external sources, through overlapping responsibilities within one bureau, or overlapping responsibilities in different bureaus. Redundancy, however, leads to overload, which is another communication problem that will be dealt with later.

Counter-bias is a discounting procedure used by officials who know their subordinates tend to distort messages; so they try to recompensate. In order to do this, the officials must have some knowledge of the distortion used. Any man who works his way up through the ranks knows best how this operates. The problem is to recognize whether the estimates of subordinates are based on relatively certain information, or on false resolutions of uncertainty. Counter-biasers tend to shift their decisions away from dependence on uncertain data and as such make shifts of the following types:

1. Away from information about the future toward information about the past or present;
2. Away from qualitative and immeasurable factors toward quantitative and measurable factors; and
3. Away from those quantitative factors that cannot easily be verified toward those that can.

People who work together eventually learn the types of distortions they can expect from each other; so the tendency is for stable organizations to be relatively distortion free. Rapidly growing organizations make this difficult, if not impossible, and they are likely to have more distortions.

Eliminating middlemen is another way to eliminate distortion. It is accomplished by having a realtively flat organization, minimizing the hierarchy, or by various by-pass devices. A flat organization eliminates many levels in the hierarchy and thus reduces the possibility for distortion through condensing or filtering.

Several kinds of by-pass devices exist which allow officials to jump the normal chain of command and communicate with other officials two or more levels away in the hierarchy. The five principle forms are:

1. Straight scoop--used to contact persons lower in the hierarchy. It is done through recurrent informal contacts, briefing teams, direct confrontations, inspections, or outside contacts.
2. Check-out by-passes test ideas with peers before sending them upward.
3. End-run by-passes get around an immediate superior who refuses to communicate certain ideas up formal channels.
4. Speed-up by-passes are similar to the straight scoop but are used to give lower officials a sense of belonging.

Distortion-proof messages are ones that can not be altered in transmission. They are used when precision and speed are very important. Such messages involves predesignated definitions or coding and easily quantifiable information. High-level military alert systems are important examples of users of distortion-proof messages.

Overload

One of the ways of coping with distortion is redundancy, but it tends to create message overload. Information overload is communication input greater than the organization or its components can handle. The tendency, once inputs reach capacity, is to resort either to satisficing or to breakdown. This relationship is illustrated in Figure 1.

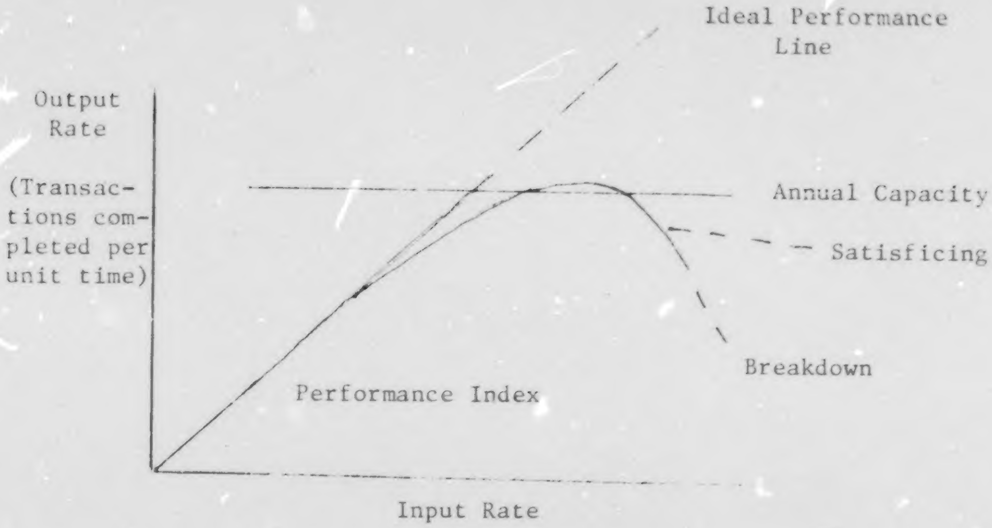


Figure 1. Communications Overload in Organized Systems

Source: [17, p. 81].

Communications and social psychology scholars list at least seven ways of responding to information overload [1, 10]. These seven techniques can be further classified into adaptive or maladaptive ways of responding. Adaptive or coping mechanisms are concerned with solving the problems; maladaptive or dysfunctional mechanisms protect the individual from breakdown but do not solve the problem.

Adaptive

1. Filtering--neglecting to process certain types of information, according to some scheme of priorities.

2. Multiple channels--using parallel channels, where one sends routine messages to a clerk for action while the other directs problem messages to a decision-maker.

3. Queing--delaying the processing of information. When this is done with correct anticipation of future lulls, it is adaptive.

Maladaptive

1. Omission--denying information to the organization on an irrational basis. Decisions are made on ease of processing rather

than on criticalness of input to the organization.

2. Error-making a mistake in interpreting the message. One common source of serious error is omitting the word not in a message or inserting it when it really isn't there.

3. Queing--delaying the processing of information. This is maladaptive when the decision to queue is done for the convenience of the individual, not in anticipation of a future lull.

4. Approximation--cutting of categories merely to reduce quantity regardless of the quality.

5. Escape--running from the task.

ENVIRONMENTAL FACTORS IN MANAGING THE COMMUNICATION SYSTEM

Most of the communication factors discussed thus far relate to the intangible, incorporeal, aspects of communication. However, there are some important physical elements which vary from one situation to another, including the office situation, and can be controlled [18].

Number of Persons Communicating

As the number of persons participating in a communication situation increases, so will the potential variability in the communication within the system increase. For example, in a two-person communication situation there is only one possible communication relationship: the two persons can communicate with each other (A↔B). In a three-person situation, however, there are four possible communication relationships: A↔B, A↔C, B↔C, and A, B, and C together as a triad. By adding a single individual the potential communication relationships increased four-fold. In a similar fashion, in a four-person system there are eleven potential 2-person, 3-person and 4-person relationships. In a five-person system there are 26 potential relationships.

To avoid chaos in communicating, formal rules to regulate the flow of messages become increasingly necessary as the number of participants in a communication system grows larger. Thus, if informality is seen as desirable for a communication situation, an attempt should be made to limit the number of participants. If such is not possible, then maximum opportunity should be provided for the larger group to communicate informally in smaller groups.

Location and Setting of the Communication System

The location can also implement (or impede) formality (or informality) in communicating among the system's participants. It is difficult to achieve informality in a lecture hall. It is equally difficult to sustain formal communication procedures within a system located at a summer resort, a weekend retreat, a commune, or in one's own home.

The location also can indicate importance of the content of communications, and of the status of the members of the communication system. "Vital affairs of government" are likely to be discussed in marble-columned "stately" buildings. Weekly religious inspirational messages and belief reinforcement are commonly conducted in temples of somber and "serious" construction or outdoors in a quiet setting by a lake or forest. If, for a dinner engagement, we want to indicate our high esteem for a friend, we are likely to select a well-appointed "prestige" restaurant. (The selection of an expensive restaurant may also indicate to other members of the party something about the status level at which we wish to be perceived by them--at least for the moment.)

In addition, the location of the communication situation can influence the kinds of channels and media used to transmit messages and the content and treatment of the messages. Think of the differences in the channels used and kinds of messages exchanged between yourself and a friend in the following locations: (a) a church; (b) a bowling alley; (c) a county commissioner's meeting; (d) a dinner at your boss' home.

Space Separating Individual Communicators

The spatial dimension of a communication situation is often taken as a given, wothout realizing how greatly the space between communicators can affect the ensuing communication. We also often fail to realize that we can exercise a significant degree of control over this dimension.

Part of the reason why we often fail to consciously recognize the importance of spatial relationships between communicators is that we learn these relationships, starting at a very young age, as part of the overall socialization process within our culture. Spatial relationships among people become an integral part of broader role relationships. A person often can grow to maturity relatively unaware of the norms governing space between communicators in his culture and in the particular social situation in which he finds himself.

Anthropological research indicates that Southern Europeans stand about six inches closer to one another than do Northern Europeans in normal conversation. The communicator who persistently maintains a distance perceptibly greater than the norm is likely to be considered by the other person as aloof, impersonal, stand-offish, or even rude (regardless of the "warmth" of the content or treatment of his messages). Similarly, the communicator who persistently "invades" the territory surrounding the other person by maintaining a distance significantly less than the norm is likely to be considered to be overly aggressive, impertinent, or even sexually "maladjusted."

The science of proxemics has developed four distance zones within which most people operate:

1. Intimate distance
    a. Close--actual contact. Constant touching as in love making, children clinging to parent.
    b. Far--6 to 18 inches. Close enough to clasp hands as in elevators, not acceptable between strangers or men in America.
2. Personal distance
    a. Close--1 to 2½ feet. Close enough for certain intimacy, domination, e.g. the cocktail party.
    b. Far--2½ to 4 feet. Limit of physical domination, beyond comfortable touching, yet within typical chatting distance.
3. Social distance
    a. Close--4 to 7 feet. Transaction range for most impersonal business.
    b. Far--7 to 12 feet. For more formal social or business relationships, e.g. the "big boss" behind his desk.
4. Public distance
    a. Close--12 to 25 feet. Classrooms and conferences.
    b. Far--more than 25 feet. The safety and security factor common for politicians.

Thus, for example, in a group communication situation, feelings of social comfort and discomfort, formality and intimacy, perceived status, and group cohesiveness can be markedly influenced by control over the amount of space alloted between individual communicators.

Space can also become a barrier to the exchange of many kinds of messages (particularly non-verbal cues), and long distances between communicators can dictate the need to use "impersonal" media such as the printed word, telephone or radio.

Spatial Arrangement of Furnishings and Accessories

Furnishings in a room or an office can be arranged so as to discourage the initiation of certain messages as well as to encourage a freer flow of other messages among communicators. If, for example, an executive or a professor receives visitors to his office from behind his desk, the visitor is likely to communicate in a more formal, even deferential, manner to the "busy" and "important" person protected by this imposing barrier. Moreover, if the visitor resents finding himself in such a one-down position, a serious communication breakdown could occur. On the other hand, if the executive removes the barrier, either by coming out from behind his desk to talk to the visitor, or by having arranged his desk so that he can swing around in his chair and face the visitor, the visitor is more likely to feel that his message (and himself as a person) is of genuine concern to the man behind the desk. In this setting a freer flow of more personal messages is encouraged.

In a larger group situation, the arrangement of tables and chairs, and the judicious positioning of specific individuals who have easily recognizable communication habits (e.g. highly vocal, reluctance to talk, tendencies to mediate arguments, low voice volume, etc.) can sometimes be a key factor in the success or failure of a business meeting, a seminar discussion, a group therapy session, or a political conference.

Finally, the spatial arrangement of furnishings in a larger setting can facilitate the formation of informal communication networks among the total body of communicators. Persons isolated from others in the system by physical barriers such as partial wall dividers, noisy mechanical or electronic equipment being placed at the end of a long table at a meeting, etc. find that it is difficult to exchange messages with anyone except the few who are closest to them. Thus, because such isolates can neither command attention nor be attended to by others, can often neither hear nor be heard, they find that the focus of power and decision making rests on other communicators who are more centrally located, and obstructed by fewer barriers to their interaction with others.

Time Selected for Communication

This factor has at least two dimensions: the duration of the communication situation and the timing of the situation in relation to other possible events. Regarding the first dimension, duration, seldom do we have unlimited time to achieve our goal in communication. We can often estimate an adequate time range, however, for a specific communication system--be it a meeting, a class lecture or discussion, or an information conversation with a friend.

All of us "manage" our time, although we are more aware that we do on some occasions than on others. Problems often arise in communication situations, however, because we sometimes forget that the other person manages his time, too. Moreover, we fail to inquire whether his time allotment for the communication situation corresponds with our time allotment. One of the reasons for fixing an agenda for meetings is an attempt to establish corresponding expectations among all participants both in terms of content and time limitations concerning the messages to be exchanged.

The timing of a communication situation implies a sensitivity to the other person's existing message "load," and to his priorities for receiving new messages. Obviously, if too many other events (or messages) would compete with your message at a particular time, then quite likely your message would have a greater chance of being attended to by your intended receiver if it were rescheduled at another time. Whenever we hear the utterance, "It went in one ear and out the other," we should ask whether we selected a time for communicating when too many other messages compete with our own thus markedly reducing its impact.

The possible combinations of physical elements of a communication situation are infinite. The task of selecting the most adequate "mix" of these elements is rarely a simply undertaking.

Since each communication situation is unique, the optimal mix of physical elements for a particular situation must be tailored for the given situation. Moreover, you must remember that your choice of elements to structure the physical situation must also take into account a host of interrelated non-physical factors, such as: your intent or purpose in communicating, the present state of beliefs of those with whom you wish to communicate, the location of the persons with whom you wish to communicate (both in relation to you and in relation to one another), and the resources (mechanical, electronic, and human) which you have to help you in communicating.

THE PLANNING ORGANIZATION

When a business organization becomes concerned about survival in a hostile environment and recognizes that change is necessary to maintain its market or growth pattern, it often organizes a research and development group or some form of a planning organization. The dominant interest of a planning organization, then, is innovation, planned change. The same situation is true for a planning group within a governmental unit--it is concerned with change which affects its community. Rural development is a perfect example of this situation, where planning groups, whatever their name, have been created as adjuncts of some level of governmental structure.

Professional workers, such as you gentlemen, in an innovative organization such as a planning group are faced with two distinct problems--dealing with others within the planning organization, and dealing with interest universes, your clients.

Organizing the Planning Organization

The planning organization attached to a governmental unit is not unlike the research and development office in a business corporation. The objectives basically are the same--to create new ideas, which will be implemented by the parent group. Creativity requires some special conditions which are different from the normal, routine patterns of office structure. Thompson has summarized these special conditions by describing the characteristics of employees in the innovative organization and the conditions or rules under which they work [22].

The individual employee is a professional, i.e., has engaged in a long period of pre-entry, professional training and tries to apply these skills to a wide variety of situations. The professional employee substitutes satisfactions from the search process, professional growth, and esteem of knowledgeable peers for the usual extrinsic rewards of income, power and status.. This means that he may have loyalty and orientation to a profession that are stronger than his ties to an organization or a bureaucracy. He may in fact view the organization as an opportunity for professional growth rather than as an entity for survival. Somehow a balance has to be struck between complete committment to an organization and total alienation from it. Control over activities, money, and time shifts from superiors to the self and peers; and considerable autonomy and self-direction may exist in deciding at what he will work.

A structural looseness characterizes the innovative organization. There is less emphasis on narrow, nonduplicating, nonoverlapping definitions of duties and responsibilities. Job descriptions are of the professional type rather than duties type. Other forms of organizational patterns replace the traditional hierarchy, and employees may be assigned and re-assigned on the basis of projects rather than formal departments. This means that communications will be freer and legitimate in all directions. Messages will flow towards persons with information or ideas rather than positions.

The innovative organization, then, is a much more difficult one to create and manage because it is the antithesis of the "need to control" which is an almost inevitable psychological product of the structured organization. The emphasis on the need for free resources, time, indulgence with regard to controls, decentralization and the like may be costly; but we do not know the value of novel ideas, processes, and products which such an organization brings about.

Interest Universe

You are, no doubt, discovering that one of the most unique and pressing problems of the local government planner is dealing with the various interest universes. There are various formal relationships established by law that the planning group must observe. At the same time there are informal interactions with and expectations that arise from dealing with members of these interest universes. Examples of these intest universes are: local citizenry as a whole, organized community pressure groups, executives of local government units, legislative bodies, governmental administrative units, the judiciary, and ad hoc relationships. Joiner [9, p. 38] has summarized how some of these may be viewed:

1. What are the relationships of the planning agency with the local citizenry as a whole (i.e., the local "community public")?

2. What are the relationships of the planning agency with organized community pressure groups?

(a) With local groups only indirectly affected by implementation of planning goals such as Rotary, Lions, etc.?

(b) With local groups directly affected by implementation of planning goals, such as the Realtors' Association, etc.?

(c) With specific structures in the community that possibly are only indirectly affected but have interests coinciding with the interests of directly and indirectly affected governmental and nongovernmental structures, e.g., local political parties, the press, etc.?

3. What are the relationships of the local planning agency with the chief executive or executives (if any) of the local governmental unit or units within the jurisdiction of the agency, with the chief professional administrator, e.g., city manager, county controller, etc. (if any), of the local governmental unit or units concerned?

4. What are the relationships of the local planning agency with the local legislative body or bodies (city council, county board of supervisors, etc.) of the local governmental unit or units within its jurisdication? With special substantive legislative committees, such as the planning committee, and with legislative appropriations committees?

5. What are the relationships of the local planning agency with administrative organizations of the local unit or units within the jurisdication of the agency?

(a) With administrative organizations as staff units, such as personnel, purchasing, etc.?

(b) With administrative organizations serving primarily as line (substantive) units, such as the Department of Public Works, etc.?

6. What are the relationships of the local planning agency with structures within the judicial process?

(a) With the local, state, and (occasionally) federal courts?

(b) With administrative instrumentalities of judicial procedures and implementations of decisions, such as city attorney, county sheriff, etc.?

7. What are the relationships of the local planning agency with governmental structures within the state and the national governments?

8. What specifically are the relationships of the local planning agency with units of local government other than the unit that established the agency?

EPILOGUE

The objective of this paper has been to summarize some basic concepts of organization theory and communication with organizations. The approach has been to identify important kinds of problems that exist in many kinds of organizations rather than to prescribe the ideal organizational and communication pattern. Who knows what the ideal is? Presumably it is getting the best possible job done with as little fuss as possible. In communication terms, that means getting the message to as many people as need it, and no one else, with as few intermediaries in the network as possible. Knowing some of these communication hangups hopefully will help you do that. Dealing with people and groups is fundamentally a communications process.

Based upon what we know about communications within organizations, we can speculate with a scenario about the nature of these communication patterns you face as a local planner, change agent.

> Planning groups are relatively new to local, rural governments in Oklahoma. Large amounts of uncertainty about roles and functions exist in these planning groups. They are not stable, old-line organizations and, therefore, probably depend on informal patterns more than on formal patterns of communication. Most attempts to create a structure for the planning group probably falls within the traditional form of organization. Because of the relatively small number of people employed as professional planners or change agents, there may be little problem of distortion of messages traveling up the hierarchy, although there may be considerable amounts of distortion in messages that cross the boundary of the organization. The organization is probably burdened with information overload. A considerable amount of queuing exists principally of the maladaptive type because future lulls are unlikely in this business. Overload also results in errors in interpretation and approximation from time pressures. Much of the deliberations of the planning council occur in quite formal settings, run by parliamentary procedure, while many important decisions are shaped in informal "wheeling-and-dealing" by the community informal power structure outside the meeting room.

How dows this scenario describe your organization?

What kinds of communication problems mentioned in this paper do you recognize in your daily situation?

BIBLIOGRAPHY

[1] Anonymous, *Ekistics*, 28:295-296.

[2] Davis, Keith, "A Method of Studying Communication Patterns in Organizations," *Journal of Personnel Psychology*, 1953.

[3] Davis, Keith, "Management Communication and the Grapevine," *Harvard Business Review*, 1953.

[4] Downs, Anthony, "Communications in Bureaus," *Inside Bureaucracy*, Boston, Little, Brown and Company, Chapter 10, 1967.

[5] Fast, Julius, *Body Language*, Pocket Books, [illegible]c., May, 1971.

[6] Gardner, John W., *Self-Renewal: The Individual and the Innovative Society*, Harper Colophon Books, Harper and Row, 1963.

[7] Guetzkow, Harold, "Communications in Organizations," *Handbook or Organizations*, James G. March (Ed.), Chapter 12, Rand McNally and Company, 1965.

[8] Hawley, Willia D. and Frederick M. Wirt (Eds.), *The Search for Community Power*, Prentice-Hall, Inc., 1968.

[9] Joiner, Charles A., *Organizational Analysis: Political, Sociological, and Administrative Processes of Local Government*, Institute for Community Development and Services, Michigan State University, East Lansing, Michigan, 1964.

[10] Katz, Daniel and Robert L. Kahn, *The Social Psychology of Organizations*, John Wiley & Sons, Inc., 1961.

[11] Lifton, Walter M., *Working With Groups: Group Process and Individual Growth*, John Wiley and Sons, Inc., 1961.

[12] Lippitt, Ronald, Jeanne Watson and Bruce Westley, *The Dynamics of Planned Change*, Harcourt, Brace and Company, 1958.

[13] Litterer, Joseph A., *Organizations: Structure and Behavior*, Volume I, John Wiley & Sons, Inc., 1969.

[14] Litterer, Joseph A., *Organizations: Systems, Control and Adaptation*, Volumn II, John Wiley & Sons, Inc., 1969.

[15] March, James G. (Ed.), *Handbook of Organizations*, Rand McNally & Company, 1965.

[16] McCleery, Richard, "Communication Patterns as Bases of Systems of Authority and Power," Theoretical Studies in Social Organization of the Prison, Social Science Research Council, Pamphlet 15, March, 1960.

[17] Meier, Richard L., A Communications Theory of Urban Growth, Cambridge, M.I.T. Press, 1962.

[18] Michigan State University, Student Reading Material, Communication 100, East Lansing, Communication Department, Winter, 1970.

[19] Phillips, Gerald M., Communication and the Small Group, The Bobbs-Merrill Co., 1966.

[20] Rogers, Everett M., Modernization Among Peasants: The Impact of Communication, Holt, Rinehart and Winston, Inc., 1969.

[21] Schachter, Stanley, "Deviation, Rejection, and Communication," Journal of Abnormal and Social Psychology, Vol. 46, April, 1951.

[22] Thompson, Victor A., "Bureaucracy and Innovation," Administrative Science Quarterly, Graduate School of Business and Public Administration, Cornell University, Ithaca, New York, June, 1965.

AREA ANALYSIS BY MEANS OF AN ECONOMIC BASE STUDY

Dean Schreiner and Dave Flood[*]

Much can be learned about areas and communities by merely looking at the markets which they serve. Communities produce for several different markets. A number of firms and individuals in the community produce for the local market. That is, products and services of their labor are used by other firms and businesses within the community or by residents of the community. As an example, the local banker provides services to businesses and households within the community.

Other firms and individuals produce for a different type of market--such as exports to other communities. Products moving out of the community to some distant market are considered as serving basic markets of the community and are referred to as export markets. A military base within the community is considered a basic market. A community that serves as a trade center for several other smaller communities considers that portion of its trade going to other communities as a basic market.

Except in a subsistence economy local markets exist only because a community serves other more basic markets. Production for basic markets by any given community or area is the result, in part, of certain locational attributes of that community. Resource endowment and closeness to markets determines those products in which a community has a comparative advantage relative to other communities. External demand for these products becomes an important determinant of community growth. Technology also affects a community's production for basic markets. Some products produced by communities become technologically obsolete such as harness making and buggy manufacturing. Other communities are affected by technology through substantial changes in production processes such as occurs in agriculture. The need for extensive resources such as farm labor is diminished. Those firms and the businesses that serve basic markets form what is termed the "economic base" of the community. Agriculture, to a large degree, serves basic markets (exports) and for most rural communities is a major part of their economic base. Oklahoma State University forms a major part of the economic base for the community of Stillwater. OSU serves the "export market" of higher education for the state an, in fact, the nation and the entire world.

PURPOSES OF AN ECONOMIC BASE STUDY

Many decisions by private businesses and community leaders are based on general levels of economic growth or decline of communities. If the community is expected to grow, sufficient public investment should occur to provide the amount of services desired at some future time period. If growth is not expected to occur, cost of replacement of depreciated or obsolete public investment in some community services must be weighted against public cost of obtaining those services elsewhere.

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[*] Associate Professor and Research Assistant, Department of Agricultural Economics, Oklahoma State University.

One way to project the level of general economic growth for a community is to project its economic base. A full explanation of expected changes in the community's economic base would mean specifying a theory of area growth and applying it to the particular community. Various theories of area economic growth have been discussed in an earlier session. Rather than adopting a particular theory of area growth, discussion will be centered on information to be gained from analyzing the present composition of the economic base and infer expected results to community growth. Attention is now turned to a discussion of the components of an economic base study by means of an example. Specific relationships between local markets and basic markets are computed.

COMPONENTS OF AN ECONOMIC BASE STUDY

Three major components of an economic base study can be identified. First is to structure the local economy by means of classifying firms into industry groupings and identify those markets which are served by the groupings. Second is to interrelate the various markets and estimate their interdependence. Finally, it is necessary to analyze basic markets which form the economic base for expected changes and relate these changes back to community growth or decline.

Structuring a Local Economy

All firms and businesses produce for a market. Gross receipts obtained from sales less expenditures for material and service inputs equals net income. Wage earners and business proprietors can also be associated with amount of gross receipts. Therefore markets represent sources of income and sources of employment.

Two broad types of markets have so far been identified: (1) local markets and (2) basic markets. Local markets may be further disaggregated by functional use. Local markets represent purchases by business firms for current production; purchases by households; local government purchases; or purchases for long term business investments. Basic markets represent sources of demand that are external to the community and include exports and federal government purchases.

Each business in the community can be classified as serving one or more of the markets specified above. A listing of all firms with a division of their gross receipts going to each type of market would be a cumbersome way of expressing the community economic base. Aggregating of similar firms to a few distinct types of industries with the corresponding weighted distribution of gross receipts to the various markets gives a concise picture of the structure of a local economy.

Firms and businesses for Planning Region Nine of South Central Oklahoma have been aggregated to represent three industry groupings: (1) agriculture, mining and manufacturng; (2) construction, transportation, communications, finance, and services; and (3) retail and wholesale trade. Estimates of the distribution of gross receipts for each industry serving the local and basic markets have been made and are recorded in Table 1.

Approximately 63 percent of the gross receipts of industry 1 are derived from the basic markets of exports and federal government. Almost one-third of sales by industry 1 go to other local industries within the planning region. Retail and wholesale trade derives 80 percent of its gross receipts from local markets with the major part, 57 percent, coming from local consumption by households. Industry 2 distributes 74 percent of its gross sales to local markets versus 26 percent to basic markets.

As indicated earlier, markets represent sources of area income and area employment. Assuming distribution of gross receipts by market source uniformily represents distribution of income and employment, Table 1 can be used to associate industry income and employment by market source. Employment control totals by industry have been allocated to local and basic markets in proportion to the distribution of gross receipts as given in Table 1. Table 2 records the employment transaction flows by market. Of the 22,068 jobs in the agriculture, mining and manufacturing industry, 6,968 serve other industries in the local markets and 13,303 serve the basic market of exports. Total number of jobs in the three private industry categories equaled 54,694 of which 32,994 served local markets and 21,700 served basic markets in 1970.

Government employment is included in the bottom of Table 2. State and local government employment is assumed to serve local markets whereas federal employment is assumed basic. Total employment in Planning Region Nine serving local markets equals 41,091 versus 28,096 serving basic markets.

Market Relationships (Direct and Indirect Employment Effects)

Figure 1 represents employment flows by market source for Planning Region Nine. Basic markets represent flows going out of the region or flows stimulated by factors not controlled within the region. Regional exports represent a significant share of regional employment serving markets outside of the area. Federal government purchases and federal employment constitute markets not controlled within the region. Employment serving investment needs is pictured in Figure 1 as externally stimulated. In reality, employment serving this market may in part be determined externally and in part internally induced by other factors within the region. However, it represents a relatively insignificant market for small regions such as Planning Region Nine.

Local markets are internally oriented and represent employment flows back to the region. Employment serving other local industries

Table 1. Distribution of Industry Sales (Percent) Planning Region Nine South Central Oklahoma 1970

	Industry	SIC Codes	Local Markets				Basic Markets		
			Industries (1) - (3)	Consumption (4)	Governments (5)	Investment (6)	Federal Government (7)	Exports (8)	Total
(1)	Agriculture, Mining and Manufacturing	01-09 10-14 19-39	31.58	4.00	0.51	0.44	3.19	60.28	100.00
(2)	Construction, Transportation, Utilities, Finance and Services	15-17 40-49 60-67 70-89	23.74	44.36	2.62	2.81	11.29	15.19	100.00
(3)	Retail and Wholesale	50-59	18.71	56.97	2.56	1.83	11.75	8.18	100.00

Table 2. Employment Transaction Flows Planning Region Nine South Central Oklahoma 1970

Industry	Local Markets					Basic Markets			
	Industries (1) - (3)	Consumption (4)	Governments (5)	Investment (6)	Total	Federal Government (7)	Exports (8)	Total	Total
(1) Agriculture, Mining and Manufacturing	6968	883	113	97	8061	704	13303	14007	22068
(2) Construction, Transportation, Utilities, Finance and Services	4311	8057	475	510	13353	2051	2759	4810	18163
(3) Retail and Wholesale Trade	2706	8240	370	264	11580	1700	1183	2883	14463
Total	13985	17180	958	871	32994	4455	17245	21700	54694
Government									
Local					6900				6900
State					1197				1197
Federal								6396	6396
Total					41091			28096	69187

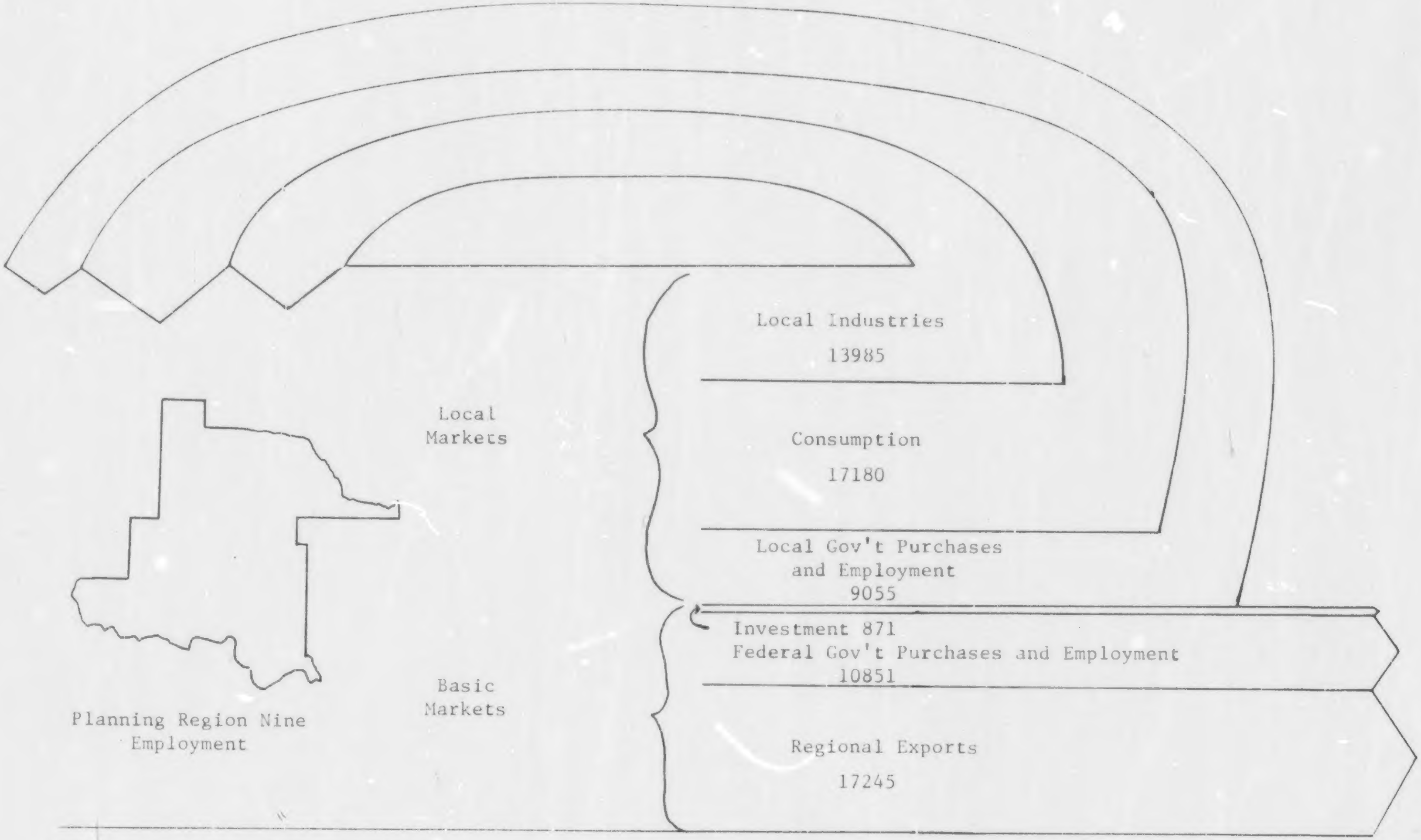
Local Industries
13985
Consumption
17180
Local Gov't Purchases
and Employment
9055
Investment 871
Federal Gov't Purchases and Employment
10851
Regional Exports
17245
Local
Markets
Basic
Markets
Planning Region Nine
Employment

Figure 1. Direct Allocation of Employment by Market Source, 1970

represents an intermediate use in the process of producing for a final use. Final use of such employment is in terms of final production for local consumption, local government, investment, federal government or regional exports. Allocation of this employment is made indirectly to such final uses. Local consumption and local government markets are further assumed to be regionally induced by levels of employment serving basic markets. The results of these market relationships for Planning Region Nine are discussed in the following section.

Approximately 20 percent of regional employment is used to serve the needs of other industries in Planning Region Nine. It represents over 25 percent of regional private employment. Table 3 is an expansion of Table 1 showing the direct distribution of industry sales to other industries as well as to final uses. Over 23 percent of sales from agriculture, mining and manufacturing is to other firms within the industry, 2.5 percent to firms in industry 2 and about 6 percent to firms in industry 3.

Sales to other industries eventually end up as indirect sales to final markets, assuming proportional distributions based on Table 3.[1] That is, retail and wholesale trade services of industry 3 provided to farmers (such as fertilizer sales) indirectly are allocated to one of the final use markets of consumption, investment, governments or exports. In a similar manner, all interindustry sales are indirectly allocated to a final market. Table 4 shows the allocation of industry sales directly and indirectly to final market usage. Over 80 percent of agricultural, mining and manufacturing industry sales directly and indirectly end up as regional exports. About 55 percent of industry 2 and 64 percent of industry 3 are directly and indirectly allocated to local consumption within the region.

Allocation of industry sales to final markets may be expressed in terms of persons employed to serve these markets. Table 5 shows that 24,731 persons are employed to serve directly and indirectly the regional export market. Similarly, 21,883 persons are employed to serve the local consumption market. Figure 2 shows the circular employment flows by market source where local and basic markets include direct and indirect employment allocations. Employment serving basic markets has been augmented by 9,002 persons because of indirect allocations. Including government employment, a total of 37,969 persons serve basic markets directly and indirectly versus 31,218 persons serving local markets.

EFFECTS OF CHANGES IN MARKETS

Induced Consumption and Local Government

Economic base theory suggests that local markets exist only to serve basic markets. If we define the economic base of Planning Region

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[1] See Charles M. Tiebout, The Community Economic Base Study, Committee for Economic Development, Supp. Paper No. 16 for method of indirect market distribution of industry sales.

Table 3. Distribution of Industry Sales to Other Industries and to Final Markets (Percent) Planning Region Nine South Central Oklahoma 1970

Industry	Industry			Total Local Industry	Final Markets[1/]					Total Final Markets	Total
	(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)		
(1) Agriculture, Mining and Manufacturing	23.48	2.48	5.62	31.58	4.00	0.51	0.44	3.10	60.28	68.42	100
(2) Construction, Transportation, Utilities, Finance and Services	7.53	8.29	7.92	23.74	44.36	2.62	2.81	11.29	15.19	76.27	100
(3) Retail and Wholesale Trade	8.11	3.61	6.99	18.71	56.97	2.56	1.83	11.75	8.18	81.29	100

[1/] See Table 1 for description of final markets.

[2/] May not add to 100 percent due to rounding.

Table 4. Direct and Indirect Allocation of Industry Sales to Final Markets (Percent) Planning Region Nine 1970

Industry		Final Markets					
		Consumption (4)	Local Governments (5)	Investment (6)	Federal Government (7)	Regional Exports (8)	Total
(1) Agriculture, Mining and Manufacturing	Direct	4.00	0.51	0.44	3.19	60.28	68.42
	Indirect	7.70	0.49	0.36	2.41	20.42	31.38
	Total	11.70	1.00	0.80	5.60	80.70	99.80[1]
(2) Construction, Transportation, Utilities, Finance and Services	Direct	44.36	2.62	2.81	11.29	15.19	76.27
	Indirect	10.54	0.58	0.49	2.61	9.41	23.63
	Total	54.90	3.20	3.30	13.90	24.60	99.90[1]
(3) Retail and Wholesale Trade	Direct	56.97	2.56	1.83	11.75	8.18	81.29
	Indirect	7.43	0.44	0.37	1.95	8.52	18.71
	Total	64.40	3.00	2.20	13.70	16.70	100.00

[1] Does not sum to 100 percent due to rounding.

Table 5. Direct and Indirect Employment Transaction Flows to Final Markets Planning Region Nine 1970

Industry		Final Markets					Total
		Consumption (4)	Local Governments (5)	Investment (6)	Federal Government (7)	Regional Exports (8)	
(1) Agriculture, Mining and Manufacturing	Direct	883	113	97	704	13303	15100
	Indirect	1704	109	80	534	4541	6968
	Total	2587	222	177	1238	17844	22068
(2) Construction, Transportation, Utilities, Finance and Services	Direct	8057	475	510	2051	2759	13852
	Indirect	1924	107	90	477	1713	4311
	Total	9981	582	600	2528	4472	18163
(3) Retail and Wholesale Trade	Direct	8240	370	264	1700	1183	11757
	Indirect	1075	64	54	281	1232	2706
	Total	9315	434	318	1981	2415	14463
Industry Total	Direct	17180	958	871	4455	17245	40709
	Indirect	4703	280	224	1292	7486	13985
	Total	21883	1238	1095	5747	24731	54694
(4) Government Employment							
Local and State			8097				8097
Federal					6396		6396
Total Employment		21883	9335	1095	12143	24731	69187

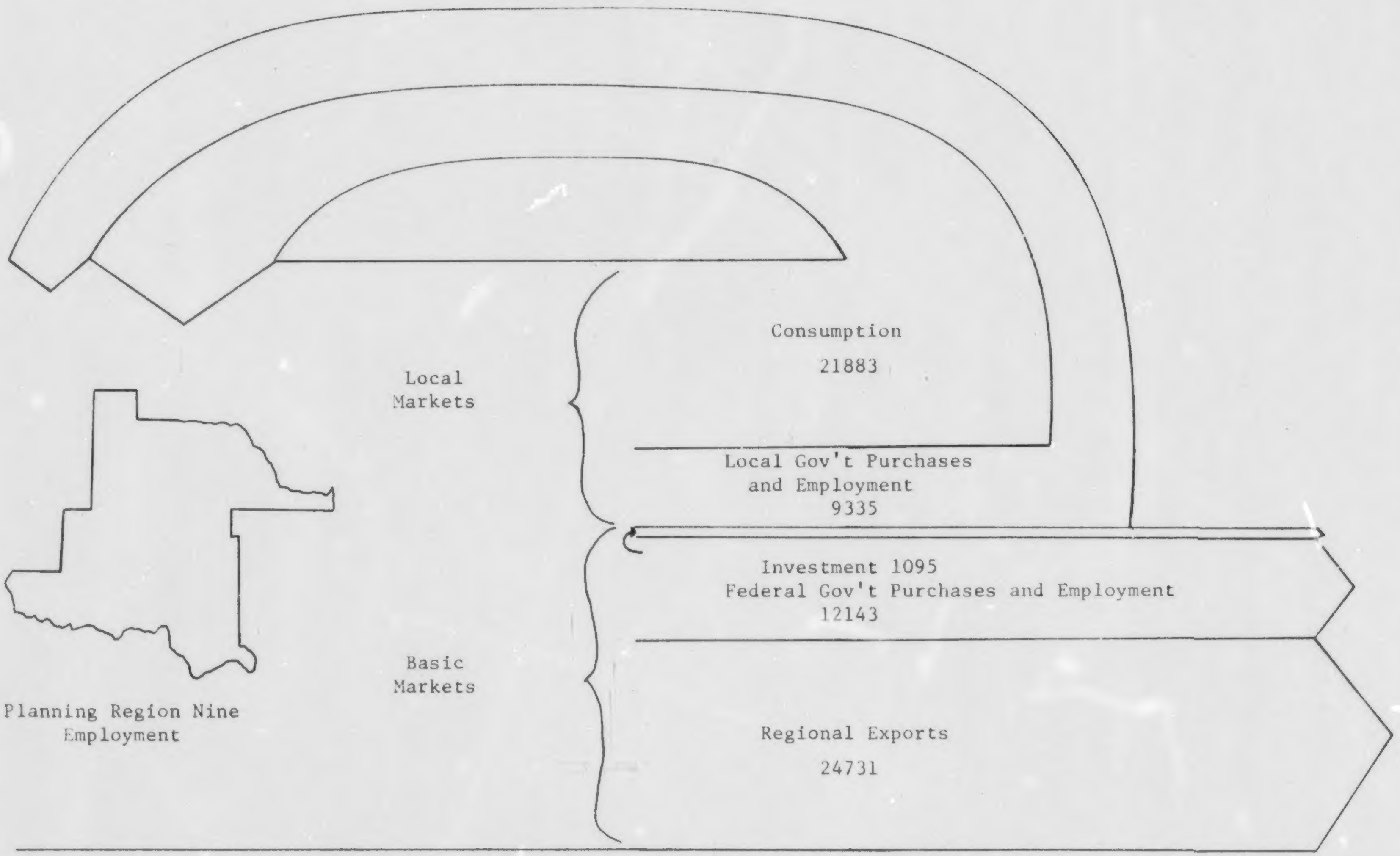
Consumption
21883
Local Gov't Purchases
and Employment
9335
Investment 1095
Federal Gov't Purchases and Employment
12143
Regional Exports
24731
Local
Markets
Basic
Markets
Planning Region Nine
Employment

Figure 2. Direct and Indirect Allocation of Employment by Market Source, 1970

Nine as including that employment serving markets of regional exports, federal government purchases, and investment plus federal employment, then employment serving local consumption and local government exist only because of the economic base employment. Economic base theory further states that there is a relationship between additions to employment serving the economic base and additions to employment serving local markets.

As a first approximation of this relationship, economic base studies assume there is a proportional relationship between employment serving local consumption needs and total regional employment. This means that for each person employed to serve the markets of local governments, investment, federal government and regional exports there is a fixed proportional amount of employment needed to service local consumption needs. Using data from Table 5 the fixed proportional amount is equal to:

$$\frac{\text{Nonbasic employment}}{\text{Basic employment}} = \frac{21,883}{47,304} = 0.46$$

This may also be expressed as a market employment multiplier by adding one to the above ratio. For each person employed to serve the basic markets (markets five through eight in Table 5) a total multiple of 1.46 jobs are created including the original job.

Employment serving local government markets as well as direct local government employment may also be assumed to be proportional to total regional employment. In turn we conclude that local government markets and employment are created only because the employment serving the more basic markets exists. This adds 9,335 persons in Planning Region Nine to the nonbasic category and increases the ratio to:

$$\frac{\text{Nonbasic employment}}{\text{Basic employment}} = \frac{31,218}{37,969} = 0.82$$

and the multiplier for employment serving investment, federal government and regional exports equals 1.82.

Employment Multipliers by Major Industries

So far the analysis has been in terms of broad markets of exports, federal government, etc. Individual industries within the region have differing amounts of linkages to other industries. The amount of linkages to other industries determines the size of the individual industry multiplier and the amount of indirect employment generated per unit of direct employment for that industry in serving any one of the final markets.

Data from Table 3 are the basis for showing the amount of linkages between industries. Applying the industry employment control totals to the distribution of industry sales gives an employment transactions table and is recorded in Table 6.

Table 6. Employment Transactions

Industry	Industry (1)	(2)	(3)
(1) Agriculture, Mining, Manufacturing	5182	547	1240
(2) Construction, Transportation, Utilities, Finance and Services	1368	1506	1439
(3) Retail and Wholesale Trade	1173	522	1011

According to the distribution of industry sales, 1,368 persons were employed in construction, transportation, utilities, finance and services to the industry of agriculture, mining, and manufacturing. The data in Table 6 can have a specific meaning. Assuming fixed proportionality, it can be inferred that it requires 1,368 persons in industry 2 to employ 22,068 persons in industry 1. In other words it requires 0.062 persons in industry 2 to provide necessary inputs for the output from one individual in industry 1. Similar direct requirements have been computed for all three industries and are given in Table 7.

Table 7. Direct Employment Requirements

Industry	Industry (1)	(2)	(3)
(1) Agriculture, Mining, Manufacturing	0.2348	0.0301	0.0857
(2) Construction, Transportation, Utilities, Finance and Services	0.0620	0.0829	0.0995
(3) Retail and Wholesale Trade	0.0532	0.0287	0.0699

One further manipulation of the data provides the interesting results of industry employment multipliers. Suppose we are interested in knowing the total employment effect for the planning region from the addition of one person employed in industry 1 to provide output for any one of the final markets specified earlier (for example exports). From Table 7 we note that it requires 0.23 additional persons from industry 1, 0.06 persons from industry 2 and 0.05 persons from industry 3 to provide inputs for the person serving the final market of industry 1. These are only the first round effects. In order to employ the 0.06 persons in industry 2 it requires certain inputs according to requirements as specified in Table 7. That is 0.0620 X 0.0301 = 0.0019 are the second round requirements from industry 1 and 0.0620 X 0.0829 = 0.0051 are the second round requirements from industry 2. Mathematical computer programs are available to calculate all of the indirect effects due to linkages between industries and need not concern us here.[2] It is of importance to know that interdependencies between industries is quantifiable and can be expressed as multipliers. These results are given in Table 8.

Table 8. Direct and Indirect Employment Requirements

Industry	Industry		
	(1)	(2)	(3)
(1) Agriculture, Mining, Manufacturing	1.3195	0.0473	0.1266
(2) Construction, Transportation, Utilities, Finance and Services	0.0977	1.0976	0.1264
(3) Retail and Wholesale Trade	0.0785	0.0366	1.3394
Total	1.4957	1.1814	1.3394

For each person employed in industry 1 to serve one of the final markets, it requires 1.32 persons directly and indirectly within the same industry including the person serving the final market. In addition it requires 0.10 and 0.08 persons in industries 2 and 3 respectively. The total planning region employment multiplier is 1.50 for industry 1 which interprets as the total amount of employment associated directly and indirectly with the original job serving a final market.

Using the market multipliers derived in the preceeding section the induced effects of household consumption and local governments can now be included. Each of the direct and indirect production employment multipliers was multiplied by the induced consumption and induced consumption and local government market multipliers to give the results in Table 9. As an example of the interpretation of these multipliers let us assume a manufacturing firm with an expected labor force of 100 new jobs located in the planning region and whose output is being exported. If the firm is typical of the present types of firms included in industry 1 the interaction between this firm and other firms of the region will generate an additional 49.6 production jobs (1.496 X 100 = 149.6) for a total of 149.6 new jobs. In addition, because of the local consumption requirements of new employment households the induced consumption effects generate additional employment equal to 68.8 jobs. [(2.184 X 100) - 149.6 = 68.8]. Induced effects from local government markets and local government employment generate an additional 53.8 jobs. [(2.722 X 100) - 218.4 = 53.8]. These results indicate that

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[2] See William H. Miernyk, Input-Output Analysis, Random House Publishing, for methods of computing direct and indirect requirements.

Table 9. Employment Multipliers

	Direct and Indirect (1)	Direct, Indirect and Induced Consumption (2)	Direct, Indirect and Induced Consumption and Local Govt's (3)
(1) Agriculture, Mining, Manufacturing	1.496	2.185	2.722
(2) Construction, Transportation, Utilities, Finance and Services	1.181	1.725	2.150
(3) Retail and Wholesale Trade	1.339	1.956	2.438

100 new jobs in manufacturing can potentially create a total of 272 jobs in the planning region including the 100 new jobs.

The multipliers in Table 9 should be viewed as probably upper limits to potential new job creation. Several reasons are given for this statement. First, the labor participation rate may change for the region indicating that a second or additional person in the household accepts a job. Consumption and local government induced effects will be biased upwards under these circumstances. Second, firms may not be operating at full capacity with their present labor force, buildings and equipment. With the new firm's presence existing firms may merely use their present resources more fully. Third, firms interacting with the new manufacturing firm may be merely substituting different markets for their output. This is especially true with processing firms. Farms and ranches substitute processing markets within the region for previous export markets. Fourth, the new manufacturing firm may not be typical of present firms in that industry. Bias of the multipliers may be either upward or downward depending on the technical nature of the new firm. Fifth, induced consumption and local government effects may be lagged responses to new employment and require several time periods before complete interaction is felt. Sixth, the new firm may draw part of its labor force from outside the region on a commuting basis. Induced consumption and local government effects would be overestimated.

DATA REQUIREMENTS

Data availability is a major consideration in the type of economic base analysis to be performed for a planning region. Primary data by means of a firm questionnaire were used to construct Tables 1 and 3 for the present study. Secondary data were used for employment control totals by industry groupings. Not all planning regions have primary data available.

Rough estimats of industry sales by major markets may be made for small regions (county or city) by someone knowledgeable about the local economy structure. Other indirect methods of measuring the economic base are given in Tiebout.[3] In general the indirect methods are inferior to direct observation of firm's markets.

Alternatively, employment multipliers estimated for one region, such as Planning Region Nine, may be assumed for other regions if certain minimum conditions are common to the two regions. First, size of the two regions needs to be comparable in terms of population and geography. Second, the size and structure of cities and trade centers should be somewhat comparable. For instance, do the regions have the same number of trade centers between 15,000 and 30,000 population and are they similarly distributed across the region? Third, are regions comparable distances from larger trade centers such as Oklahoma City, Tulsa or Fort Smith, Arkansas. Fourth, are regions structurally similar in terms of industry groupings such as agriculture, mining or manufacturing.

Because of the expense and time involved in estimating the economic base of a region the use of other study results may give reasonably good information as first approximations. Regions in general should include a good economic base study as part of the data information system for their overall economic development plan.

CONCLUSIONS

Growth or decline of a small region is highly dependent on what happens to its basic economic activities. An economic base study in itself does not determine whether a region grows or declines but it separates the different markets and presents the industry, and for some studies, the interindustry structure of the region. Elements of growth or decline are hence easier to discern. It also provides a framework for making economic projections. In turn, projections form the basis for community services planning.

Data for Planning Region Nine in South Central Oklahoma were used to calculate various types of employment multipliers from an economic base study. Data are a limiting factor in estimating extensive economic base studies for a particular region. However, employment multipliers derived from other studies may be applicable for a given region of interest. Other limitations of static employment multipliers derived from economic base studies have been noted.

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[3] Charles M. Tiebout, op. cit.

THE WHAT, WHEN, WHERE AND HOW OF FEASIBILITY STUDIES

R. W. Schermerhorn*

This topic basically involves determining the feasibility of a project before it is undertaken. Noah Webster defines feasible as "capable of being dealt with successfully". If I were to restate this definition so that it would define a feasibility study, it would appear as follows: A study designed to determine whether or not a project proposal is economically sound--whether or not it will make money.

With this type of a definition one would most likely at this point say that it is obvious that anyone contemplating initiation of an agri-business enterprise, or any enterprise for that matter, will conduct a thorough study to determine if the undertaking will be profitable (economically sound) before actually initiating it. But is this really true? I would suggest that this is not commonly true. I am reminded of a poultry processing plant that closed its doors after one year of operation in Delmarva; a vegetable processing plant in Western Maryland that really never opened its doors for business; two different feed mills in Oklahoma that folded in less than three years; and numerous grain elevators in the Midwest that were salvaged through mergers with other elevators.

This is not the end of the story either, as I am familiar with a number of agri-business firms that will cease to exist unless some drastic adjustments are made in the very near future--and for some, its too late for that. The condition of some of these firms is a direct result of inadequate feasibility analysis before opening their doors, while the condition of others, for example, many of our cotton gins, is a result of changing environmental operating conditions over the years. Whatever the cause, failure of a firm in a community has a lasting impact on that community. I am reminded of a textile mill in New England that moved to another community and left the original community with more unemployed persons than were there when it was enticed to move to the original community.

It is obvious that the firms in this precarious situation got there for a variety of reasons--poor management in general, poor financial management, not adapting to industry changes, not keeping abreast of technological change, not being aware of changing market demands, not providing for adequate supplies of quality raw products, inadequate distribution systems, underpricing goods or services, underestimating the time it will take to build a market, underestimating competition, etc. I could go on with reasons, but the point I would like to make here is that an adequate, well conducted feasibility analysis of the project before initiating it could eliminate many of these problems. Further, for those problems that could not be eliminated, at the beginning, the analysis would at least make the firm aware of the problems so that solutions could be sought to solve them in the future.

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*Professor and Extension Economist-Management, Department of Agricultural Economics, Oklahoma State University.

Lets discuss some situations lending themselves to the need for a feasibility analysis.

1. The firm is considering any type of combination or alliance of firms to improve the operating position and further the common interest of these firms. This situation includes mergers, acquisitions, consolidation and/or federation. We probably have many agribusiness firms in the nation today that are or should be considering this type of firm reorganization. In most cases the need for this type of reorganization stems from either a decline in volume handled by the Cooperative such as is the case with many cotton gins; a change in the market structure which requires larger volumes to supply buyers, such as is the case for some vegetable processing plants; or the need to assure a supply of inputs or a market for the production of a facility, such as is the case with integrated poultry operations. Further, many times we find that duplicated efforts can be eliminated and thereby reduce costs, such as is the case with feed delivery routes or retail milk delivery routes.

2. A firm is considering expansion of present facilities. Examples are a larger feed mill or a processing plant. Many times this desire may stem from expanded demands for goods or services or from an attempt to gain economies of size in the production process.

3. A firm is considering building new facilities. This becomes important when facilities have become obsolete over the past few years and the firm now finds it difficult to compete.

4. A firm is considering relocation or a new location. This may be a result of changing conditions within specific areas, such as a change in wage rates or public opinion regarding pollution control; or it may be a result of a decline in production of the raw product in the area due to competitive advantages in another--witness the change, or growth in cattle feeding in the Panhandle area and the movement or relocation of packing plants to the area.

5. A firm is considering adoption of new technology. This situation is continually arising as technology is rapidly changing in many of our agri-business industries.

6. A firm is considering adding a new service or product line. Many of our cooperatives have added services and products over the years because their members indicated a need. Further, many of these products or services have been added without the benefit of a feasibility analysis to determine if the addition would be profitable. I feel strongly that anytime our members really want a new service they will be willing

to pay for it. Witness many of our custom feeding mixing facilities that have been added that are simply not paying for themselves today.

7. The firm is considering geographical expansion of its market area. Many agri-business firms have expanded their market area in an attempt to gain a larger share of the market and in turn achieve a greater ability to negotiate price with buyers and/or sellers.

8. The firm is considering diversification of its operations. Many of our agri-business firms have diversified in an attempt to eliminate reliance on one product group, to reduce overhead costs and to more fully utilize existing facilities or distribution channels.

In short, I feel that it is an absolute necessity to conduct a feasibility analysis anytime a firm considers any change in its present operating situation. Why? Because the ultimate purpose of conducting a feasibility analysis is to avoid the costs associated with making a wrong decision.

We can readily see that the term feasibility is extremely broad and covers a multitude of varying situations that may develop in the individual firm. As a consequence, the content of, and the methodology followed in conducting any given feasibility study could and does vary considerably. For this reason, this paper deals with the content of a complete feasibility study, i.e., what is involved in conducting a feasibility analysis of a completely new enterprise proposal. This will allow me to include comments related to analyzing partial projects, such as a firm building a new facility to compliment it's on-going business or adding a new service to better serve its clientle, as well as to discuss the potential impact on a community from this proposed enterprise.

A complete feasibility study can be divided into two major phases: An Analysis of Environmental Conditions; and An Analysis of Directly Influencing Factors. Lets take a look at the factors analyzed in each phase.

ANALYSIS OF ENVIRONMENTAL CONDITIONS

This phase of the feasibility study concerns itself primarily with analysis of the general factors affecting where a facility will be located. These are the factors considered after determination has been made relative to the general area of location as affected by supply of raw product and availability of markets, i.e., a meat packing plant has decided to locate in the Texas or Oklahoma Panhandle area now wants a specific city or town site. This phase of a feasibility study analyzes the availability of the many facilities and services which a firm feels essential to create an acceptable environment in which the plant can operate and its management and labor force can live.

The following is an outline of the type of factors which are considered in this phase of the analysis:

A. Government
   1. Form
   2. Assessment policies
   3. Types of taxes
   4. Tax rates
   5. Zoning ordinances
   6. Building Codes
   7. Regulations
   8. Industrial incentives

B. Local Services
   1. Fire protection-insurance rates
   2. Police protection
   3. Crime rate-trends
   4. Refuse removal

C. Population Characteristics
   1. Demographic profile
   2. Population trends
   3. Income characteristics
   4. Cost of living
   5. Home and durable goods ownership

D. Housing
   1. New home construction and cost
   2. Adequacy of sale or rental housing
   3. Rental costs
   4. Condition of residential neighborhoods
   5. Area Climate

E. Medical Facilities
   1. Availability of doctors, dentists and hospital beds
   2. Availability of laboratory facilities
   3. Cost of medical and dental care

F. Religious Facilities
   1. Number and denominations of churches in area

G. Accomodations
   1. Availability of accomodations for corporate traffic
   2. Availability of group meeting accomodations

H. Cultural and Recreational Facilities
   1. Civil and professional organizations
   2. Libraries
   3. Recreation facilities

I. Postal Services
   1. Type and frequency of service

J. News Media
    1. Newspapers
    2. T.V. and radio
    3. Degree of local news coverage

K. Local Industries
    1. Cooperation of business leaders
    2. Supply and service firms
    3. Types of industries

L. Utilities
    1. Electrical power-availability and rates
    2. Gas service-availability and rates
    3. Telephone service-type and rates
    4. Water Service-availability, source, usage, rates
    5. Sewer Service-adequacy, regulations, charges

M. Financial Services
    1. Banking Services
        a. Loan policies
        b. Asset structures
        c. Degree of interest in financing new ventures
    2. Local Investors
    3. State, Federal or Local sources of financing

N. Education
    1. Elementary and Secondary School System
        a. Number of Schools
        b. Pupil-teacher ratio
        c. Accreditation
        d. Student enrollment
        e. Acceptance of students at colleges
        f. Percentage students at college
        g. Training availability for handicapped children
    2. Vocational Schools
        a. Number of schools
        b. Types of training
        c. Number of graduates
    3. Higher Education
        a. Availability of Universities
        b. Research facilities
    4. Other
        a. Adult education
        b. Testing services

O. Labor
    1. Labor profile (Education, age, skills, etc.)
    2. Availability of labor (types, location, seasonal)
    3. Unions
    4. Transportation for commuters
    5. Wage scales
    6. Employee turnover rate-absenteeism

7. Unemployed
8. Labor relations history
9. Labor practices (vacations, holidays, etc.)
10. Labor legislation
11. State and Local taxes applied to labor

F. Transportation (Rail, Truck, Water, Air, Pipelines)
1. Types available-freight and passenger
2. Adequacy of facilities
3. Record of performance
4. Cost and rates
5. Regulations or tariffs
6. Transit privileges[1/]

ANALYSIS OF DIRECTLY INFLUENCING FACTORS

This phase of a complete feasibility study probably has the most relevance to situations in agribusiness firms because it includes the types of factors most commonly analyzed for evaluating potential projects within an agribusiness firm.

This phase is further divided into three parts: (1) Raw product supply; (2) Productive process; and (3) Marketing. The analysis of these factors is what I call the "guts" of a feasibility study. It is the phase that provides the basic information required for loan applications and is used to show whether or not the proposed operation can economically survive, i.e., make profits and be able to pay the interest and principal associated with the loan. In short, this phase of a feasibility study is designed to answer three questions: 1) What factors must be considered to tell us whether or not we should go into business (raw product, markets, etc.); 2) How much will it cost us to enter the business and what facilities will we need; and 3) How much profit can we make?

Raw Product Supply

This part of the analysis concentrates upon determining the economic availability of the raw product inputs for the proposed enterprise--fat cattle for a meat packing plant; feeder cattle and feed grain for a feed lot; vegetables for a packing shed or a processing plant; broilers or turkeys for a poultry processing plant; or grain for an elevator, for example.

There are usually four basic factors that need to be analyzed when determining raw product supply:

1. The minimum economic size of the controlling facility. Determination of the minimum economic size of the facility will

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[1/] For a more complete listing of factors considered by firms when locating new facilities see, "Questions Asked by Firms When Locating a Facility", Southern Oklahoma Development Association, Ardmore Air Parks, Oklahoma.

in turn set the amount of raw product required to reach this scale of operation. We might, for example, determine that the minimum size meat packing plant, considering today's level of technology, would be 60 head per hour; or 4,000 birds per hour in a broiler processing plant; or a one barrel alfalfa dehydrating plant.

The minimum economic size of facility can be determined by actual cost analysis of existing plants or synthesizing model facilities from specifications from equipment companies.

2. *Plant requirements*. Following the determination of the minimum size economic facility we will know how much raw product will be required. For example, we would need to procure for the above mentioned facilities; 124,800 head of cattle annually, 8 million broilers annually, or about 1,000 acres of alfalfa.

3. *Availability of requirements*. Now that we know the amount of raw product required we must determine whether or not this quantity is available of adequate quality at a price we can afford to pay. Further, there has usually evolved for any given agribusiness a maximum distance from the facility within which the firm must draw its raw product. In many cases, this distance is determined by the effect on quality of time between harvest and processing. For example, the raw product for an alfalfa dehydrating plant must be secured within a radius of 10 miles of the plant. In other cases, economics of transportation define the area within which the facility draws its raw product; for example, most broiler processing firms draw broilers, and deliver feed within a 25 mile or less radius of the facility.

   With these factors, or limitations, in mind, we can proceed with the determination of the availability of the raw product. Usually this involves a survey of the defined production area (the drawing area for the plant). The survey would most likely be an analysis of statistical production data for the area to determine if this is enough of raw material to allow economic operation of the facility. The survey may also include, and in my opinion should include, a personal survey of the growers in the area to determine future production plans and future price expectations. Further, in the case where the present volume of production is not adequate for facility needs, a survey should be made of potential producers to determine their willingness to enter production of the raw product.

4. *Assured supply of requirements*. It is not enough to know that there is currently adequate production for plant needs in the area. What we *must* know is whether we can be assured that we can secure what we need. In other words; Is the source of raw material dependable? What arrangements can be made for procurement? Would growers sign long-term contracts to assure

adequate source of supply? These questions apply to cooperatives as well as non-cooperatives. I recall an egg marketing cooperative in Georgia which failed because each time the price of eggs went up across the line in Florida the members sold there instead of to their cooperative (in this case there was a lack of financial interest in their cooperative because the state provided the facilities, which was the basic reason for the lack of regular patronage.) It is also important to determine what is the current market use of the raw product; then, what degree of market entry appears possible, or more simply, can we compete for this use.

To summarise the supply determination phase of a feasibility study, we need to know how much raw material we will need in order to operate our facility at an economic size; and then we need to know if this raw product is economically available and if this source of supplv is dependable.

Facility Determination

This phase of a feasibility study analyzes the production process of the proposed facility. It analyzes the specific facility needs, capital requirements, financing requirements and the potential costs and returns from the operation of the facilities. Lets look at the factors considered in this phase of the study.

1. Facility Needs. In the discussion of the supply determination I refered to the necessity of first determining the minimum size of the controlling facility. In most of the agri-business undertakings today there are multi-facilities involved and one is the limiting facility to the rest. For example, the processing plant in an integrated broiler operation is the limiting facility and all other facilities (hatchery, grow-out, feed mill, etc.) must be geared to the processing plant. This phase of the analysis is involved with determining the specific facility needs for the entire operation. In this stage special analysis must be made of current stages of technology which the enterprise can adopt, and must adopt, in order to compete within the competitive environment it must operate.

2. Investment Capital Needs. Once we have determined our specific facility needs we are in the position to determine what facilities will cost. This part of the study is relatively easy to prepare once it is decided exactly what types of facilities we want. Our costs then, are estimates from the equipment companies, construction companies, and utility companies.

3. Labor Needs. Following facility needs determination, we can easily put together our labor needs. We will know it takes so many persons to operate a feed mill, processing plant, or whatever. We can then compare our needs to available labor force in the area. Let me at

this point emphasize that a given percent unemployed in an area is no indication as to the available labor force nor their willingness to work at the type of work you may have. I am reminded here of a packing plant in the Panhandle area that experienced well over a 200 percent turnover in labor force during the first year's operation. This results in a very costly training program for the work force.

I might here add one other comment concerning the importance of an analysis of labor needs and availability. Most government loans are highly concerned with the job creation potential of their loans. They prefer lending to those enterprises that create the most jobs for any given level of capital investment.

The other part of the labor needs question involves the availability of management and technically trained persons. This, obviously, is an extremely important factor which generally will dictate the success or failure of the undertaking. The only comment I would have here, other than you must have qualified management, is that you must be willing to pay the price that it takes to secure top-notch personnel.

4. Cost of operation. This phase of the study analyzes the information thus far determined by applying appropriate wage rates; management costs; raw material inputs costs; various operational costs such as utilities; and your fixed costs of repairs and maintenance, depreciation, interest, taxes, and insurance. This process should involve the development of cost budgets for the various phases of the operation. The result will give us a per-unit cost of operation.

5. Profitability. With costs of operation determined, profitability of the operation can be projected following estimation of expected prices. I will discuss price projections in a later section of this paper, so for now lets assume price projections have been made. We would then prepare our projected income statements to determine the profitability of the operation. I also recommend preparation of a "break-even chart" which will show us at what level of production, given our costs and returns information, that we will be able to break-even (cover all costs of operations). Further, one can use various projected price levels in the chart to determine break-even points at various price levels. Many times the importance of a break-even chart is in knowing the minimum level of production that must be marketed to achieve the break-even point.

6. Working Capital Needs. The completion of the projected income statement has been the end of the feasibility study for many agribusiness firms. However, in my opinion the most important item has yet to be included in the study--the cash flow summary. Provision for adequate working capital is perhaps the critical item for the successful operation of a business. It is necessary to prepare a cash flow summary to determine what the cash needs will

be for the firm and the sources of cash available to meet these needs.

To be more specific, we need to know how much capital will be needed for day-to-day operation of the facilities (wages, inventories, utilities, raw product, etc.) and when this capital will be required. Further, we need to know if this capital is going to come from receipts, borrowings, or sale of stock. The cash flow is also required to help us determine size of loans, length of loans, probably pay-back periods, and amount of interest and principle we can periodically pay back. In short, it is an absolute necessity to include a cash flow summary in the feasibility study. I have witnessed far too many agri-business firms that find themselves in extremely poor operation condition because they didn't adequately provide themselves working capital.

To summarize the facility determination stage of a feasibility study, we need to know what facilities we need; how much they will cost; what our operational items such as labor, utilities, and raw product will cost; how much profit will we make; and how much working capital will we need to safely operate the business.

Market Determination

In most feasibility studies determination of the market for a product or service is the most difficult part of the study. We need to determine current and potential consumption of our product or service; types of markets we will use; types of distribution systems we will use; how we are going to enter the market; types of buyers we will attempt to sell; the types of selling arrangements we will use; and the prices we will charge for our product. Lets look at what should be analyzed to answer these questions.

1. Consumption. We need to determine current consumption of our product or service; the trends in this consumption; the current consumption and trends in consumption of competing products or service; in what form, qualities, volumes, etc. is our product or service consumed; who is currently providing for consumption demands and are they adequately providing for demands; how will competitors react if we enter the market; at what capacity are current competitors operating and can we compete with them?

2. Markets. Relative to markets we need to know what kind of markets exist; where are these markets and what will it cost to serve these markets?

3. Distribution system. Next we need to know what type of distribution system will best fit our needs. We need to determine whether we will have our own sales force or use

brokers and the cost involved: whether we will market under our own brand versus a buyer's brand; will we transport the product to the market, and if so what method will we use, should we buy or lease equipment, and what will be the cost?

4. Market entry. We next need to determine how our product will be introduced in the market--through lower prices, advertising and promotion, or some other method; how long will it take to build up the market to desired sales volume; and what will be the costs involved?

5. Buyers. Who will be our buyers is the next question. What types of buyers-chain stores, wholesalers, or institutions in the case of consumer products; what quantities will they require; what product specifications will the buyers require; how reliable are buyers; have they indicated interest in our product; and what kind of committment will they make to buy our product?

6. Selling arrangement. What kind of selling arrangements will we encounter needs to be answered next. What kind of pricing arrangements will we make; what kind of delivery schedules will be required; what kind of payment schedules will we encounter; what kind of services will we have to provide with our product; and what will be the costs involved; will we have sales offices and if so where should they be, how many salesmen should we have, what type of compensation plans should we have for salesmen and what will all this cost?

7. Prices. Critical to our entire analysis is the question, what price can we expect to charge for our product or service? This question can be partially answered by analysis of past prices and price trends and, based upon this analysis, project future expected prices in light of expected future consumption demands as affected by expected future economic conditions. This, of course, is a relatively difficult task, especially if we attempt to predict prices very far into the future. We should obviously take into consideration in our predictions the expectations of buyers and other suppliers of our product.

SUMMARY

Let's summarize. A feasibility study is a must before any type of a firm reorganization is attempted. This will help the firm avoid the costs associated with making a wrong decision. A basic feasibility study analyzes the factors that directly affect the success of the operation such as: (1) Assurance that an adequate supply of quality raw products can be procured at an acceptable price; (2) Determination of facility needs, capital requirements, financing requirements and potential costs and returns from the operation; and (3) Assurance that an adequate market can be secured for the output of the operation. In short, the analysis of these factors will determine whether or not the venture will be economically sound and make a profitable return for the members.

In addition to the analysis of directly influencing factors a complete feasibility study also analyzes the availability of the many facilities and services which the firm feels essential to create an acceptable environment in which the plant can operate and its management and labor force can live.

If all of these factors are analyzed adequately and are determined to be favorable for economic operation of the facility, the undertaking should be profitable. Let me conclude with one final qualifying remark--even though the analysis shows that the enterprise will be profitable, the final profit determining factor is management. The potential firm, obviously, must have a competent management staff who follow through in the planning, organizing, directing, staffing, and controlling functions of management in order to insure a profitable undertaking.

MEASURING THE IMPACT OF NEW INDUSTRY ON RURAL COMMUNITIES IN OKLAHOMA

Ron Shaffer and Luther Tweeten*

Introduction

Impact of industry on rural communities is a topical subject. This paper outlines the procedures to be used by communities in measuring this impact. The objectives are to develop and apply a method to measure industrial impact and to examine how various factors influence the magnitude of the new investment. We will use two hypothetical communities and industries to illustrate the economic impact from the location of a new plant. The results will show how the impact can vary among firms or among communities. These are points that local civic leaders must keep in mind as communities pursue industrial development.

The procedure used is labeled the "net gain to the community" model. The model applies partial budgeting, used widely in farm management, to determine the changes that occur in a community from industrialization. There are two types of effects from industrialization: primary (direct) and secondary (indirect and induced). The direct changes are measured as persons hired by the new plant, and the wages paid by the new plant. The indirect and induced effects are measured by multipliers. The multipliers reflect the fact that an injection of employment or income into an economy affects the rest of the economy in a predictable manner. The indirect changes may be thought of as additional income to local merchants resulting from the injection of income in the local economy from purchases by the plant and consumption spending by plant workers. The induced effects are a result of a change in local consumption from more people and/or more income in the household sector. The employment multipliers are defined in a similar manner, measuring indirect and induced employment stemming from employment in the new industry. The employment multiplier reflects the fact that the increased trade causes local merchants to hire additional salesmen, etc.

Table 1 gives the estimated multipliers for the industries and communities in our example. The multipliers in these tables include only the secondary effects. To estimate the total change, direct plus secondary, the digit "one" needs to be added to the estimates in Table 1. The size of the multiplier is affected by two major factors. First the linkages of the stimulating force, the new plant in this example, with other segments of the local economy. The size of the multiplier is directly related to the amount of interaction between the new plant and the rest of the economy. The second factor affecting the size of the multiplier is the extent of economic activity in the area considered. If the area's economy can provide all the necessary goods and services, then all of the secondary impacts will be included. As the range of economic activity in an area is reduced there are secondary effects that are carried on external to the area studied. Doeksen and Little in a 1967 study show this effect quite clearly. A change of $1,000 in final demand for the agricultural processing sector in Oklahoma increases employment by 3.4 man-years if it is assumed all of the secondary effects are retained by Oklahoma. If part of the requirements to meet the additional demand in the agricultural processing sector come from other states, the multiplier is estimated to be 2.8. If the study area is further narrowed to a nineteen-county area in Southeastern Oklahoma, the multiplier declines to 1.2. In Table 1, firm Y may be classified as an agricultural processing firm and the county employment multiplier varies from 1.09 to 1.1, while the community multiplier ranges from 1.02 to 1.05. The point we wish to make is that national averages or even state averages of the multiple effects of a new plant at best overestimate the effects of the individual community experiences.[1] The reduction of the scope of economic activity carried on in an area reduces the size of the multiplier.

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*Research Assistant and Regents Professor, Department of Agricultural Economics, Oklahoma State University.

Table 1. Employment and Income Multipliers[1]

		County Multipliers	
Community	Firm	Employment	Income
A	Y	.1	.6
A	Z	.08	.2
B	Y	.09	.5
B	Z	.07	.2
		Community Multipliers	
		Employment	Income
A	Y	.05	.45
A	Z	.03	.15
B	Y	.02	.1
B	Z	.005	.1

[1] Note these are estimates of the secondary effects only. These are hypothetical estimates generated by the authors specifically for the problems presented in this workshop.

Problems arise in estimating the indirect and induced effects at the community level because there are no published rural community input-output studies. A portion of the labor questionnaire administered to workers at 10 plants in eastern Oklahoma deals with where the workers spend their income: What portion of the income is spent in the community, what portion is spent outside the community but in the county, and what portion is spent outside the county? Applying the percentage of income spent in the community to the county income multiplier gives an estimate of the community income multiplier. The product of this weighted multiplier and the "internalized" wages and salaries of the plant, plant payroll times percent of income spent in the community, estimates the total change that occurs in the community's income level. For our problem we assume that community A experiences a net loss of 25 percent of the income generated in the county and community B's net loss is assumed to be 50 percent of the income generated in the county. The net loss is the income spent outside the community by residents and in-commuters less the income gain from spending in the community by out-commuters.

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[1] If the secondary effects are to represent an economic gain to society previously unemployed or underemployed resources must be present in the community before a multiplier should be used. When the economy has its resources fully employed the multiplier represents only a transfer of resources between equally productive activities.

The second approach to delineation of industrial impact is to examine the incidence of the impact. What effect does the new plant have on the private sector and/or public sector? The private sector includes the labor force, local merchants, and property owners. The public sector includes the provision and financing of services by the municipal government and school district. The majority of previous studies on industrial impact--whether economic base, input-output or any other approach--place secondary emphasis on the potential changes that occur in the public sector. In rural communities the effects on the public sector can be sizable. The procedure to be outlined expands on prior work by extending a direct and indirect impact analysis to the public sector. The net gain to the community model includes direct and indirect effects on both the public and private sectors of the community. Including both sectors allows local decision makers to determine the incidence of industrial impact. The inclusion of both sectors also provides a more complete accounting of industrial impact. It is possible for the gains in one sector to add to, cancel or reduce the gains in another sector.

The Model

The model divides the community into three sectors: the private sector, the municipal government sector, and the school district sector. In each sector an accounting of the benefits and costs from the new plant allows for the estimation of the net gain or impact on that sector. Both primary and secondary benefits and costs are estimated for each sector of the community. The model is applicable at the community, county, region, or state level. Much of the information required by the model should already be part of the information used by local industrial development groups. A general outline of the model is presented in Table 2.

General Statement of the Problem

Certain assumptions are used in working the problems. Imported workers are defined as employees brought into the community by the plant

Table 2. Net Gains from Industry.

Net Gains to the Private Sector			
Benefits:			
Plant's wages and salaries internalized in the community	$_____		
Total Primary Benefits		$_____	
Internalized plant wages and salaries x community income multiplier	_____		
Total Secondary Benefits		_____	
Total Benefits to Private Sector			$_____
Costs:			
Income at previous job x number of jobs not refilled in the community	_____		
Private industrial development costs	_____		
Total Primary Costs		_____	
Income previous jobs not refilled x community income multiplier	_____		
Total Secondary Costs		_____	
Total Costs to Private Sector			_____
Net Gain to Private Sector: Total benefits - total costs			_____
Net Gains to the Municipal Government Sector			
Benefits:			
Ad valorem taxes new homes	_____		
Ad valorem taxes new plant's additional investment	_____		
Utility revenues from new plant	_____		
Utility revenues from new residents	_____		
Sales tax from plant payroll spent locally	_____		
Other tax revenues from new residents	_____		
Total Primary Benefits		_____	
Change in tax revenues from former residents	_____		
Total Secondary Benefits		_____	
Total Benefits			_____
Costs:			
Services provided new plant	_____		
Services Provided new residents	_____		
Services provided new commuters	_____		
Annual municipal government incentive costs	_____		
Total Primary Costs		_____	
Total Costs			_____

Table 2. (continued)

Net Gain to Municipal Government Sector: Total benefits - total costs			$ _____
Net Gains to the School District Sector			
Benefits:			
Ad valorem taxes new homes	$ _____		
Ad valorem taxes new plant's additional investment	_____		
Additional state aid from new students	_____		
Additional Federal aid from new students	_____		
Total Primary Benefits		$ _____	
Change in revenues from former students	_____		
Total Secondary Benefits		_____	
Total Benefits			_____
Costs:			
Additional physical plant due to new pupils	_____		
Additional educational services provided new pupils	_____		
Ad valorem tax revenues lost from tax breaks to the new plant	_____		
Total Primary Costs		_____	
Additional educational services provided former pupils	_____		
Total Secondary Costs		_____	
Total Costs			_____
Net Gain to School District Sector: Total benefits - total costs			_____
Net Gains to the Community			
Net gain to community's private sector	_____		
Net gain to the municipal government sector	_____		
Net gain to the school district sector	_____		
Net gain to the total community			_____

and they establish residence in the community. The new residents build homes with an average value of $15,000. The average monthly utility bill for the new families is $15 for electricity, $5 for water, and $2 for sewer. All utility rates are assumed to be equal to the cost of providing services excluding capital costs. All utility capital costs are paid from an ad valorem tax levy.

The average per capita or per pupil costs for the respective community are used to estimate the expenditures by the municipal and school government for the new residents. Intergovernmental revenue for city government is $15 per capita. This includes state aid from gas taxes, bus mileage, commercial vehicle taxes, and alcoholic beverage taxes returned to the city. Federal aid to the school system is assumed to be $40 per student and state aid is $280 per student.

It is assumed that any jobs that are not filled by "imported" workers or community residents are filled by in-commuters. In-commuters are workers from the surrounding rural area and other communities. To account for in-commuters use of municipal services, assume that the cost of providing municipal services for in-commuters is the same as the per capita costs of the services for the city's residents. This may be an overcharge but it will simplify calculations.

Each community in its pre-location discussions with a potential plant determines what additions to its utility, education, and transportation capacity are needed to meet the requirements of the new population and the plant. To ease the calculation requirements for these problems, the necessary annual costs for additions to public service capacity are given with each problem.

Community Structure

There are 5,000 people in community A. It is a major trade center in a county of 15,000 people. The city utilizes a one percent sales tax for general fund revenue and an ad valorem tax for its sinking fund. About 75 percent of the income generated by the residents in community A is spent in the community. Property in the community is assessed at the rate of 25 percent of fair market value. The school district's ad valorem tax levy is 45 mills and the city government levy is 10 mills. Per capita municipal government expenditures, excluding utilities, are $45. The per pupil cost of education is $600.

One thousand people live in community B. The community is not the major trade center in a county with 8,000 residents. There is no city sales tax, but an ad valorem tax is used for the municipal sinking fund. Only 50 percent of the income generated by residents in community B is assumed to be spent in the community. The assessment ratio of property in the community is 20 percent of its fair market value. The ad valorem tax levy is 45 mills for the school district and 5 mills for the city. General fund municipal expenditures, excluding utilities, are $37 per capita. The per pupil school expenditures are $620.

Firm Structure

Firm Y is the more labor-intensive plant of the prospective firms. The skill requirements for the plant are quite low. The linkages of this firm with the rest of the economy in the community are relatively high. The average annual wages paid to workers at plant Y are $3,600. The firm hires 50 men and 150 women. The firm's investment in the community is $100,000 and its annual utility bill is $28,500.

Firm Z is a capital-intensive manufacturing firm with few economic interchanges within the community. The skill levels for the plant are quite high and a minimum of a high school education is required. The average income for workers at the plant is $6,000. The firm's total investment in plant, property and equipment is $1,410,000. The firm hires 30 workers and spends $9,000 annually for municipal utilities.

Problems

Problem 1. Plant Z is able to hire all of its workers from within community A. Those hired are previously employed elsewhere at an average income of $4,000 and all of the newly hired workers' previous jobs are reflilled. The plant locates at the edge of town, requiring considerable municipal costs to provide services. The extension of utility lines and paved roads to the plant costs $50,000 which the city financed with a 20-year maturity bond issue. The annual amortized costs for the utility and road extensions to the plant is $4,360.

Problem 2. Firm Y is able to hire 120 workers from residents in community Z. Sixty laborers come from the surrounding area outside the community. One hundred and fifty of the workers hired at the plant left jobs that are not refilled. The average annual income at the workers' previous jobs is $3,000. The twenty new families the firm brings in includes 90 new residents. Ten of the "imported " workers build new homes and the remainder purchase homes that are already built. The extension of public services to new residents costs the municipal government $25,000. The forty new students cause the school system to make a $50,000 addition to the school building. The extension of utility lines and access roads to the new plant cost the city another $35,000. To finance these municipal and school costs, bonds with a 15-year maturity are sold. The amortized cost of the municipal government bonds for the new residents is $2,575 and $3,600 for the plant. The annual cost of the school bonds is $5,200.

Problem 3. The firm Z hires 20 of its workers from community B. Five workers commute and five are brought in by the firm. Only one of the workers who moves in with the plant builds a new home. There are seven school age children and four pre-school children in the new families. The total change in the community population is 20 new residents. The annual income of the local residents hired by the plant averages $3,000 prior to the location of the plant. Fifteen of the previous jobs held by local residents are refilled. Extending municipal lines to the new plant costs $6,000 and $3,000 for the new residents. The costs of extending utility lines is paid out of previous surplus funds; therefore no bonds are sold.

A local industrial development group is organized to attract firm Z and makes the following offer: The group would purchase the equipment for the firm and construct a building to the firm's specifications on a site provided. The end result of these commitments is that none of the firm's investment is subject to ad valorem taxes. The development group sold shares to provide the funding needed. The investment will be written off over a 15-year period, $94,000 per year. An additional $5,000 is needed for legal costs, title abstracts, and travel expenses and registration fees by the development group to bring in the firm.

Problem 4. Plant Y hires 200 workers initially. The labor force within community B provides 40 workers and the plant brings in 20 new workers and their families. The total gain in population from the new families is 80 people. The remainder of the work force is provided by in-commuters. Half of the "imported" workers build new homes in the community. There are 30 school age children and 10 pre-schoolers in the new families. The additional 30 pupils cause the school district to build a $50,000 addition to the school's physical plant. The school board sells bonds with a 15-year maturity to finance the addition. The annual amortized cost of this bond issue is $5,200. The sewer and water line extensions and access roads to the new plant costs the city $50,000. The cost of similar extensions to new residents is estimated to be $20,000. To finance the provision of these services the city sells $70,000 of municipal bonds. The annual amortized cost on the 15-year maturity bonds is $5,200 for the plant and $2,060 for the new residents. The average annual income of the new workers is $3,000 before they are employed by the new plant. The community's industrial development group offers firm Y a utility rate structure that reduces the firm's utility bill by 50 percent.

Solutions to Problems

Table 3 presents the net gains to the communities from the situations presented above. The workshop participants were asked to complete a form similar to Table 2 for each of the problems. Table 3 summarizes the results of those calculations. The private sector benefits and costs in Table 3 are adjusted to the community level from the county amount.

Summary and Conclusions

The purpose of the model presented is to aid local citizens in evaluating industrialization as a development alternative. The model is general in its application and is relatively easy to use. The model requires little additional information beyond that readily available or already known by community leaders.

Table 3. Results of Hypothetical Problems on Industrial Impact.

	Community A		Community B	
	Plant Z	Plant Y	Plant Z	Plant Y
	Prob. 1	Prob. 2	Prob. 3	Prob. 4
Private Sector				
Primary benefits	$135,000	$540,000	$ 90,000	$360,000
Secondary benefits	20,250	243,000	9,000	36,000
Total benefits	155,250	783,000	99,000	396,000
Primary costs	0	337,500	106,500	0
Secondary costs	0	151,880	750	0
Total costs	0	489,380	107,250	0
Net Gain	155,250	293,620	-8,250	396,000
Municipal Government Sector[1]				
Total benefits	14,078	39,706	10,635	20,980
Total costs	13,360	46,705	21,665	49,180
Net Gain	718	-7,999	-11,020	-28,200
School District Sector[1]				
Total benefits	15,862	15,613	2,375	11,850
Total costs	0	29,200	17,030	23,800
Net Gain	15,862	-13,587	-14,655	-11,950
Net Gain to the Community	$171,830	$272,034	-$33,925	$335,850

[1] In the problems given the secondary benefits and costs for the municipal government and school district were assumed zero to facilitate calculations.

The hypothetical case studies applying the model have important implications for community industrial development groups. First, even though the total community may show a positive net gain from the location of a new plant, there may be segments of the community which experience net losses. An example of this is problem 2, plant Y locating in community A. This is a partial explanation of why certain segments of a community may encourage or resist industrialization. Second, the net impact of a new plant may be beneficial to one community and detrimental to another community. This is pointed out by problems 1 and 3 or plant Z locating in communities A and B. The implication of this is that all industry may not be good for all communities. The community must evaluate prospective firms within the constraints of the community's ability to supply workers and public services.

To provide additional perspective before concluding, the actual net gains to the community (computed using the same approach as already outlined) are presented for 11 "real live" firms which located in five communities in eastern Oklahoma since 1960 and employed 10 workers or more. Products manufactured by the various firms ranged from fabricated steel to fruit drinks. Three of the firms produced furniture.

In several instances, net gains to the school sector and to the municipal government sector were negative, but the last column in Table 4 shows that net gains to the community were substantial in all cases. The column shows annual net gains as computed earlier in this study and divided by the number of employees. Average community net gain per employee was $3,559, and ranged from $2,123 to $4,903.

The eventual benefit of the firm to the community depends on how many years the annual net gain is maintained. Table 4 indicates that the community could subsidize firm F by up to $3,603 per year per job and be as well off as without the firm. If the city must pay six percent to borrow money and the firm lasts 10 years, the city can provide a grant of $28,108 to obtain the firm and just break even on the investment. This amount seems unduly high, but the Canadian government has offered $30,000 per job created in some provinces.

We do not recommend to communities that they pay such large amounts for several reasons. First, the cost is not paid by those who benefit and some community residents are made much worse off due to higher taxes, congestion, etc. Second, much risk is involved. If firm A is provided concessions valued at $28,154 per job because the community thinks the firm will stay 20 years, the city loses $28,154 minus $10,337 or $17,817 if the firm leaves in 5 years. Third, to be of maximum help to the well-being of its citizens, the community should drive the hardest bargain and grant no concessions unless necessary to obtain the firm.

The association of a community with industry is much like the institution of marriage--both are a substantial success in the main. But marriage is not right for all individuals nor is industry right for all

Table 4. Present value of community net gains per employee for selected earnings horizons (discount rate is 6 percent).

Plant Identification	Years Firm is in Community				
	Infinity	20	10	5	1
			(Dollars)		
A	40,910	28,154	18,066	10,337	2,315
B	68,207	46,940	30,120	17,234	3,860
C	69,408	53,766	30,651	17,538	3,928
D	40,076	27,580	17,697	10,126	2,268
E	86,701	59,667	38,287	21,907	4,903
F	63,651	43,804	28,108	16,083	3,603
G	49,230	33,880	21,740	12,439	2,768
H	37,501	25,808	16,561	9,476	2,123
I	48,970	33,701	21,625	12,373	2,773
J	53,448	36,783	23,602	13,505	3,025
K	122,362	51,072	32,772	18,751	4,200
AVERAGE	62,890	43,780	27,772	15,891	3,559

communities. Some spouses are too footloose and flippant to make good marriage partners--so are some firms to make good community "partners." Some spouses are interested only in their partner's money--some firms are interested only in the concessions they can get, and leave when the consessions are gone. Some spouses are interested only in a marriage partner as long as he or she works like a slave--some firms will stay only as long as labor is cheap. Some suitors are jilted so many times they decide to stay single--some communities, after unsuccessfully wooing firm after firm, finally decide industry is not for them. Maybe they don't have the labor supply, community services, markets and transportation system needed to attract and hold industry. Some grand dames will take up only with flashy men from the large city who can give them bright lights and opera--some rural communities would do well to waste no time attracting the metropolitan oriented firm and should go after the firm interested in a conscientious labor force and clean air. Polygamy is best for some societies--industrial "polygamy" is best for many rural communities, with several towns going together to court and share any firms attracted. The plant is located in the city best suited for industry, and workers from farms and surrounding towns commute to work.

ESTIMATING INTERCOUNTY BENEFITS FROM RURAL DEVELOPMENT PROGRAMS

Dean Schreiner and George Muncrief*

Association of costs and benefits from rural development is becoming more important as we become more knowledgeable about the actual processes of economic growth. Measuring the geographic distribution of benefits is viewed here as being important for the purpose of creating incentives for further development and growth. This may be necessary in part because certain jurisdictional groups are unaware of the benefits and hence do not show initiative in investing (i.e., bearing the costs) in rural development.

An example may be used to clarify this point. A local community is considering subsidizing the location of a private industrial firm. Negotiations have reached a point where the subsidy cost is greater than the breakeven point for local community benefits. However, because of hierarchical trading patterns or labor commuting patterns, a nearby community or the larger development authority of an Economic Development District stands to gain additional benefits from the location of the industrial plant. If the neighboring community or the larger authority bears part of the subsidy cost, the local community may be able to stay within the breakeven point and invite the firm to locate.

The problem has been to develop methodology and estimation procedures to measure intercommunity economic linkages and hence establish a basis for determining the distribution of benefits from rural development programs. The same procedures may serve also to assess penalties associated with certain development programs or to plan the provision of area-wide public services.

The objectives of this paper are to (1) express some of the intercommunity linkages in an economic accounting model and describe the estimation procedure and (2) provide the results of estimated intercounty linkages for a multi-county planning region in South Central Oklahoma.

A RURAL DEVELOPMENT ACCOUNTING MODEL AND ESTIMATION PROCEDURE

People frequently reside in one community but commute to jobs in another community. Trading patterns of households tend to follow a hierarchical system of trade centers which are distinguished by differences in availability of goods and services. Production firms may also follow a hierarchical system of trade centers for purchases of some inputs. Local government financing of community services is usually determined by political jurisdictions and decisions rather than locational demand for the services.

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*Associate Professor and NDEA fellow, Department of Agricultural Economics, Oklahoma State University.

Frequently it is difficult to allocate the benefits and costs of economic development programs without specifying an economic accounting model that captures in-and-out commuting of labor, consumer trading patterns, and local government financing procedures. An accounting model similar to an interregional input-output model is suggested here.

Primary data were collected by means of mail and personal interview questionnaires from a sample of firms and businesses in South Central Oklahoma (Figure 1). The questionnaire was designed (see [1] and [2] for prototype questionnaires) in a manner to distribute individual firm gross receipts on a percentage basis to other businesses and final market sources. Business firms, especially in rural areas, are very cognizant of who their customers are. Rough estimates of the distribution of their gross receipts by market source appear to be easily ascertained. The question to be asked is merely one of "Who are your customers, and what percent of your total gross receipts does each account for?" Firms were then aggregated using employment as weights.

Output of the firms and businesses was measured in terms of persons employed. Employment control totals were estimated on a county basis. Distribution of gross receipts were then applied to county control totals to give an employment transaction flow table.

Firms in South Central Oklahoma, in addition to being asked who their customers are (market distribution), were also asked where their customers came from (intercounty business patterns). In order to construct a complete interregional employment transaction flow table, it was necessary to assume that the distribution of the types of customers a business firm has is the same whether sales are within the county or in other counties within the planning region.

Corrections in the accounting model for net commuting effects were not made at this time. Hence the in- and out-commuting coefficients were assumed to be zero. For a new plant to be added in any one of the counties with a known commuting pattern for its labor force, a comparative analysis for the region can be performed on the basis of before and after plant location where the in-commuting coefficients are included for the latter case.

INTERCOUNTY DEPENDENCE RESULTS

Table 1 contains the intercounty multipliers for additions to employment serving the final demand markets of regional exports, federal government and capital formation. Viewing the column coefficients for Caddo county, if employment serving the export base for that county increases by 100 jobs, total employment in Caddo county is expected to increase by 198 jobs. By continuing down the column, employment in Grady county is shown to increase by 14 jobs due to trading relationships directly and indirectly with Caddo county.

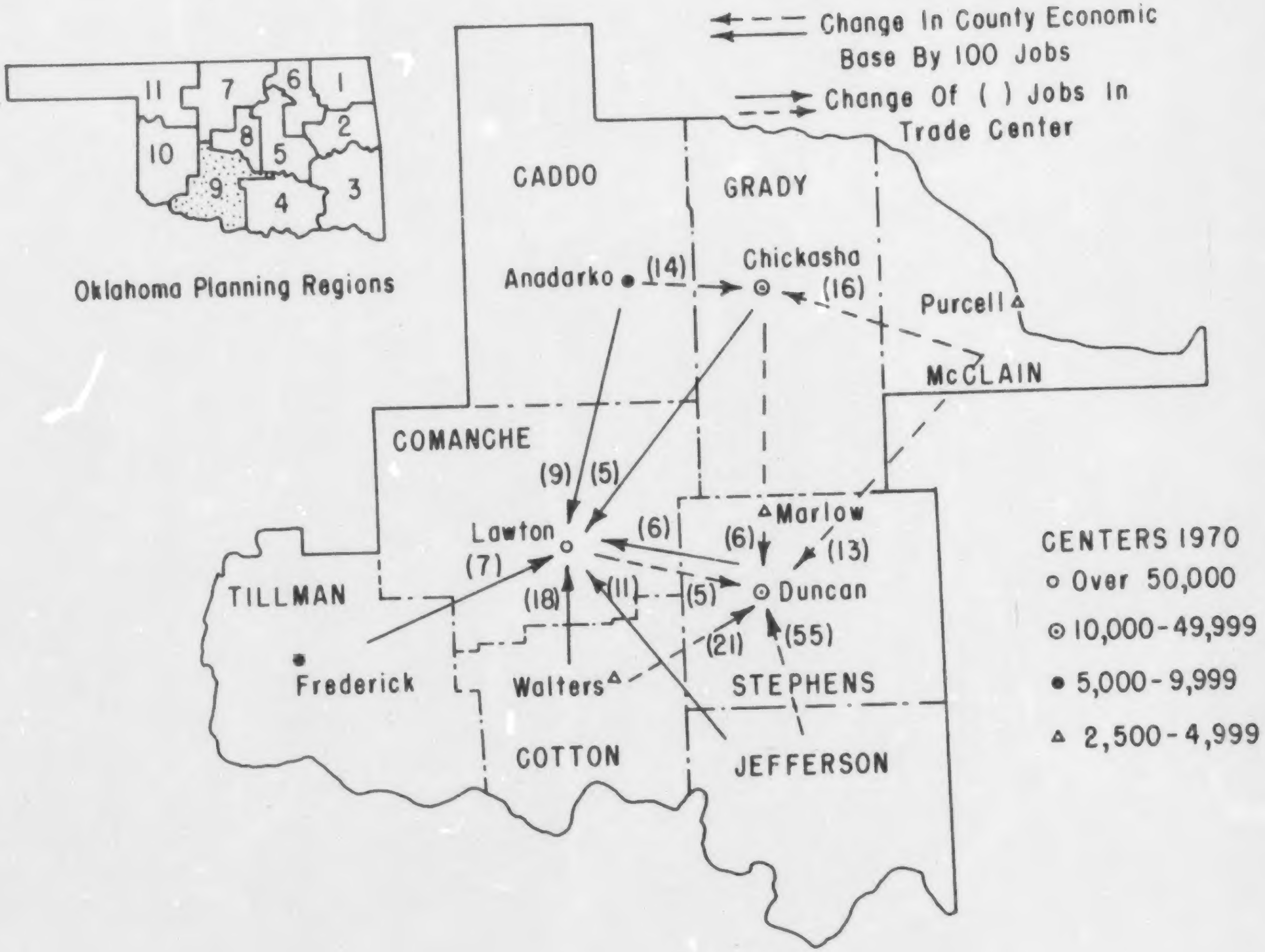
Change In County Economic Base By 100 Jobs
Change Of ( ) Jobs In Trade Center
11
7
6
1
2
10
8
5
9
4
3
Oklahoma Planning Regions
CADDO
GRADY
Anadarko
(14)
Chickasha
(16)
Purcell
McCLAIN
COMANCHE
(9)
(5)
Lawton
(6)
Marlow
(6)
(13)
(7)
TILLMAN
(18)
(11)
(5)
Duncan
(21)
(55)
Frederick
Walters
STEPHENS
COTTON
JEFFERSON
CENTERS 1970
○ Over 50,000
⊙ 10,000-49,999
● 5,000-9,999
△ 2,500-4,999

Figure 1. Intercounty Employment Dependence From a Change in Export Base Employment

Table 1. Intercounty Employment Multipliers for Delivery to Final Demand Markets of Regional Exports, Federal Government and Capital Formation, South Central Oklahoma, 1970

County	Caddo	Grady	McClain	Comanche	Stephens	Tillman	Cotton	Jefferson
Caddo	1.98[1]	0.12	0.11	0.03	0.02	0.04	0.10	0.13
Grady	0.14	2.49	0.16	0.02	0.03	---	0.04	0.03
McClain	0.02	0.02	2.82	---	---	---	---	---
Comanche	0.09	0.05	0.01	1.95	0.06	0.07	0.18	0.11
Stephens	0.03	0.06	0.13	0.05	2.13	0.02	0.21	0.55
Tillman	---	---	---	0.01	---	2.49	0.22	0.08
Cotton	---	---	---	0.01	0.02	0.02	2.01	0.06
Jefferson	---	---	---	---	0.02	---	0.04	2.64
Total[2]	2.25	2.75	3.24	2.07	2.29	2.65	2.81	3.61

[1] Each coefficient represents the employment change in the county to the left for each additional person employed for delivery to the final demand markets of the county at the top.

[2] Total direct, indirect and induced employment multiplier for Planning Region Nine.

Similarly, employment in Comanche county will increase directly and indirectly by 8 jobs and in Stephens county by 3 jobs. The employment multiplier for the total planning region equals 2.25 of which 88 percent of the employment benefits accrue within the county where the increase in final demand employment occurred and 12 percent of the benefits accrue in other counties of the region.

Each row of coefficients in Table 1 shows the importance of that county in providing certain services for all other counties. By comparing row coefficients it is possible to identify the importance of certain trade centers in the region. Figure 1 identifies the two sub-regional trade centers of Chickasha in Grady county and Duncan in Stephens county. It also identifies the regional trade center of Lawton in Comanche county. As an example, employment in Duncan is expected to increase (decrease) by 55 for an increase (decrease) of 100 jobs in the export base of Jefferson county, by 21 for a comparable increase (decrease) in Cotton county, by 5 for Comanche county, by 6 for Grady county, and by 13 for McClain county.

The multipliers in Table 1 represent static conditions and full capacity use of all resources. If local economies in rural areas tend to have excess capacity in some of the service sectors, the multipliers will over-inflate the expected secondary employment benefits from the additions to employment in those sectors serving the export base. In a similar manner, if productivity increases such as through larger class sizes in local schools (perhaps through school consolidations), the size of the multipliers will be biased upwards.

For long-run planning purposes more dynamic models can be constructed to recognize changes in relative labor productivities, capacity utilization rates, or other changes that more fully reflect growth or decline in regional economies [3].

LITERATURE CITED

[1] R. J. Kalter, An Interindustry Analysis of the Central New York Region, New York Agricultural Experiment Station Bulletin 1025, (1969).

[2] C. M. Tiebout, The Community Economic Base Study, Committee for Economic Development Supplementary Paper No. 16, New York, (1962).

[3] G. Doeksen, and D. Schreiner, A Simulation Model for Oklahoma with Economic Projections from 1963 to 1980, Bulletin B-693, Agricultural Experiment Station, Oklahoma State University, Stillwater, (May, 1971).

SELECTED CHARACTERISTICS AND LOCATION FACTORS OF NEW INDUSTRY IN EASTERN OKLAHOMA

Ron Shaffer*

What is the impact of new industry on rural areas? What community characteristics do firms consider most when selecting a new location? Research to answer these questions was done in four rural communities in Eastern Oklahoma in 1971. The size of industry investment, employment, and wages was measured; and some twenty community characteristics, such as financial incentives and accessibility to raw materials, were rated.

Industry Structure

The eight firms interviewed had a diverse product line. The products manufactured varied from furniture to telephone switching gear and from food processing to chemical feed pumps. Selected structural characteristics of the firms are presented in Table 1.

The new firms initial investment ranged from $900 to $306,000. The average investment per plant was $106,375 the first year. Average plant investment increased to $206,250 in 1970. The size of investment ranged from $30,000 to $735,000 in 1970. The plants employed an average of 36 workers in 1970. The range of number employed at the plants in 1970 varied from 11 to 80. Thus none of the plants were very large employers. Each plant averaged employing almost 16 more workers in 1970 than they did the first year of operation. The initial average work force is misleading since the three largest plants employed 130 workers and the three smallest plants employed only 20 workers. During their first year of operation, the plants had an average of $6,761 invested per worker and in 1970 this had decreased to $4,917. The decline was the result of utilizing the capacity of the plants more fully by raising employment levels in 1970 over the initial employment levels.

A Department of Commerce report on industry characteristics labeled firms with a $3,500 to $7,500 investment per worker as having a moderate investment per worker [1]; three firms would have been in this group in 1970. Three of the firms had a 1970 investment per worker of less than $3,500 and would be classified as having low investment per worker. The other two firm's 1970 per worker investment exceeded $7,500, placing them in the high investment per worker category.

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*Former Research Assistant, Department of Agricultural Economics, Oklahoma State University.

Table 1

Selected Characteristics of New Industries in Eastern Oklahoma Economic Development District

	Year Located							
	A 1965	B 1965	C 1969	D 1965	E 1967	F 1965	G 1966	H Unk.
Investment (Total) (000)								
First Year	50	6	306	70	120	1	230	60
1970	200	34	306	146	145	30	735	54
Employment								
First Year	40	11	13	14	7	2	68	22
1970	50	11	80	15	25	30	80	20
Wages (000)								
1970	250	60	20	124	100	143	650	86
Value of Shipments (000)								
First Year	550	175	335	175	80	7	200	894
1970	1,750	247	334	370	500	500	1,200	1,300
Capital/Labor Ratio								
1970	.80	.57	15.30	1.18	1.45	.21	1.13	.63
Capital/Output Ratio								
First Year	.09	.03	.91	.40	1.50	.14	1.02	.07
1970	.11	.14	.91	.40	.29	.06	.61	.04
Sales per Unit of Wages								
1970	7.00	4.12	16.70	2.98	5.00	3.50	1.85	15.12
Investment per Employee								
First Year	1,250	545	23,538	5,000	17,143	500	3,382	2,727
1970	4,000	3,091	3,825	9,733	5,800	1,000	9,188	2,700

Source: Survey taken in January, 1971 by the author.

The wages paid in 1970 by the plants ranged from $20,000 to $650,000 with an average payroll per plant of $179,053. Five of the eight plants that responded indicated a payroll of $100,000 or more paid in 1970. The volume of shipments the first year of operation ranged from $7,000 to $984,000 with an average of $302,000. By 1970 the range in volume of shipments was $334,000 to $1,750,000 with an average of $775,125. In 1970 the wages paid by the firms averaged 23 percent of the value of shipments. The previously mentioned Department of Commerce study would label these firms as having moderate labor intensities. The 1970 capital-output ratio ranged from 0.4 to .91 while the capital-labor ratio ranged from .21 to 1.45 except for firm C with 15.30.

Location Factors

To help aid the effectiveness of any industrial development program, it should emphasize the crucial factors in the potential plant's location decision process. Management was questioned about the five most critical location factors at the community level. In Table 2 the factors mentioned are listed along with the number of times that the factor was ranked at varying levels of importance. A ranking of 1 implies most important and 5 means least important of the five factors mentioned.

Access to raw materials was the most frequently mentioned community location factor. This was to be expected since two firms were food processors and three firms were furniture manufacturers. Thus five of the eight firms could be categorized as raw material oriented firms. Personal reasons and availability of plant site were the next most frequently mentioned factors. A third of the firms mentioned personal reasons such as home of owner as most important. These latter two factors have implications for local industrial development leaders. First, the provision of industrial tracts will allow a new firm to start production with a minimal delay because of utility installation, zoning or even haggling over land prices. The availability of an industrial tract may avoid the frequently mentioned tendency for rapid price appreciation of a potential industrial site. The prior zoning of a tract as industrial certainly cannot hurt a community's industrial development program. Second, an often overlooked prospect for industrial development is aid to the "homegrown" firm. One of the firms in the study started as a one-man operation in a garage in 1956. Assistance from the local industrial development group helped this firm grow to a $146,000 investment and 15 jobs in 1970. Communities may receive a larger portion of the benefits from a homegrown industry than they would from a firm that is attracted from elsewhere.

In order to provide an estimate of the relative importance in the number of times a factor was mentioned a weighted index was developed. All factors ranked first were given a weight of five. If the factor was ranked second the weight used was four. The weighted index for a location factor is the sum of the product of the weights and number of

Table 2

Plant Location Factors in Community Selection

Location Factor	Number of Times Ranked First	Second	Third	Fourth	Fifth	Total	Weighted Index
Personal reasons	3		1			4	18
Access to raw materials	2		1	1	1	5	16
Availability of plant site	1	2	1			4	16
Access to markets	2		1			3	13
Availability of labor	1			1		2	7
Area already established as center for industry		1		1		2	6
Promotional activities of state and/or local groups		1		1		2	6
Area for future expansion		1			1	2	5
Financial Incentives from state			1	1		2	5
Lack of unionization		1				1	4
Labor costs		1				1	4
Living conditions		1				1	4
Climate			1			1	3
Availability of industrial power supplies			1			1	3
Utilities			1			1	3
Financial incentives from community				1		1	2
Availability of supporting business services				1		1	2
Financial aid from local private sources					2	2	2
Schools				1		1	2
Decentralization					1	1	1

Source: Survey conducted in January, 1971 by author.

times a factor was ranked at a given level. The factor with the highest index was ranked more important than other factors with a lower index value. The weighted index indicated some changes in relative importance of locational factors. Personal reasons became the most important factor and access to materials along with the availability of a plant site were the second most crucial factors. Other changes in relative importance of factors occurred at the lower end of the scale. Financial aid from local private sources declined in relative importance when the weighted index was used while schools gained in relative importance. The relative rankings of the remaining factors is more distinct with the weighted index. The large number of factors tied (with one or two responses) were separated into different levels of relative importance when the weighted index was used.

From the weighted index the following conclusions may be drawn. First, no one location factor is dominant--each firm has somewhat unique requirements. Secondly, the four most crucial factors were important over a wide range of different firms. Finally, the distinction between the four most crucial factors and other factors mentioned was clearer when a weighted index was used.

Conclusions

Some conclusions can be made from these results. First, a wide variety of industries are locating in rural areas. Most of the firms would be classified as light industry with moderate capital and labor intensities. Local community development groups seek to cultivate their homegrown industries. Finally, the firms that have located in the study area were more resource or raw material oriented than either labor or market oriented.

LITERATURE CITED

[1] Area Redevelopment Administration. Growth and Labor Characteristics of Manufacturing Industries. U. S. Department of Commerce. Washington, D. C. 1964.

AVERAGE COST OF COMMON SCHOOLS

Fred White and Luther Tweeten[*]

This paper shows costs of elementary (grades 1-8) and secondary (grades 9-12) schools applicable to rural areas. A thorough analysis of a school district's operation requires cost data on all aspects of education and transportation. The problem of providing high-quality education at a reasonable cost in rural areas is intensified by the high cost of transportation. Educational costs can be divided into a fixed component, embodied in plant and equipment, and a variable component. Major variable costs include administration, instruction, and operation and maintenance of plant.

In planning for educational services, it is necessary to know how costs of education vary with the number of students in a district. We are concerned with a long-run period, a time interval long enough to allow a school district to vary in size. The long-tun average cost curve shows the minimum cost per student of educating various numbers of students. The purposes of this paper are to show (1) the shape of these cost curves, and (2) the application of the cost curves determining the optimum school district size.

Large variation among schools in the quality of educational programs makes it necessary to account for and control these variations in estimating the size-cost relationship. Measures used herein of quality are average eleventh grade composite achievement scores and the number of nonvocational credit units offered.

DATA

The Oklahoma State Department of Education evaluated student needs in the Oklahoma schools. The statewide study assessed school programs, pupil backgrounds, and resultant achievement. In a stratified sample, the population of school districts in Oklahoma was divided into subpopulations according to geographic location and size of school district. The five regions were the Tulsa and Oklahoma City area and northwestern, northeastern, southwestern and southeastern Oklahoma. Each region was then stratified into three school district sizes: under 500 students, between 500 and 2,000 students, and over 2,000 students. These subpopulations together comprise all Oklahoma school districts.

The sample was designed to be proportional, sampling five percent of the districts in each stratum and was drawn independently and randomly in each stratum. The survey, conducted in March, 1970, involved 2,255 fourth graders, 1,993 eighth graders and 1,903 eleventh graders.

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[*] Respectively, former Research Assistant and Regents Professor, Department of Agricultural Economics, Oklahoma State University.

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Complete data were acquired from 27 independent Oklahoma school districts. Since there were several school sites in many districts, the number of school sites was well above 27. The size of the school districts sampled ranged from under 100 pupils to more than 70,000 pupils. The stratification insured that every geographic region in the state and size class was represented in the sample.

After the schools were randomly drawn, students in the eleventh grade of the high schools and students in the fourth and eighth grades of schools that "feed" into these high schools completed standardized achievement tests. In addition, data were acquired from school administrators concerning finances, program, organization, facilities, equipment, teacher qualifications, and community characteristics. Although observations were made at the individual student level, the school district is the unit of analysis in this report.

COST OF EDUCATIONAL SERVICES

Administration

Administration consists of those activities which regulate and control the affairs of the school district. Three major items were included in administrative expenditures--salaries, contractual services, and other expenses. The variables which were considered to affect administrative costs include pupil-teacher ratio for each level of ADA. The average cost curve for achievement held at the Oklahoma average is shown in Figure 1 by the curve LR. Under actual conditions, a school district may operate on a short-term cost curve above the level that is achieved under a full long-term adjustment. The short-run curves are based on a given size plant. In the case illustrated, the short-run curves SR_1 and SR_2 are derived by holding the number of teachers constant at 50 and 150, respectively. These curves show that average administrative costs per student ADA can be high with too many teachers.

School Plant Operation and Maintenance

Accounts for operation and maintenance of plant for the school system record all current expenditures for keeping the grounds, buildings and equipment in good condition. Operation of plant includes cleaning, lighting, heating, communications, power and other such activities required on a regular basis. Maintenance of plant consists of repairs or replacements needed to keep the physical plant in good condition.

Figure 2 shows the average per pupil cost of plant operation and maintenance derived from Appendix equation (2) when achievement is held constant at the Oklahoma average. Long-term adjustments in ADA produce significant economies of size up to 2,000 ADA as shown by LR. The short-run cost curves SR_1 and SR_2 were derived by holding the number of

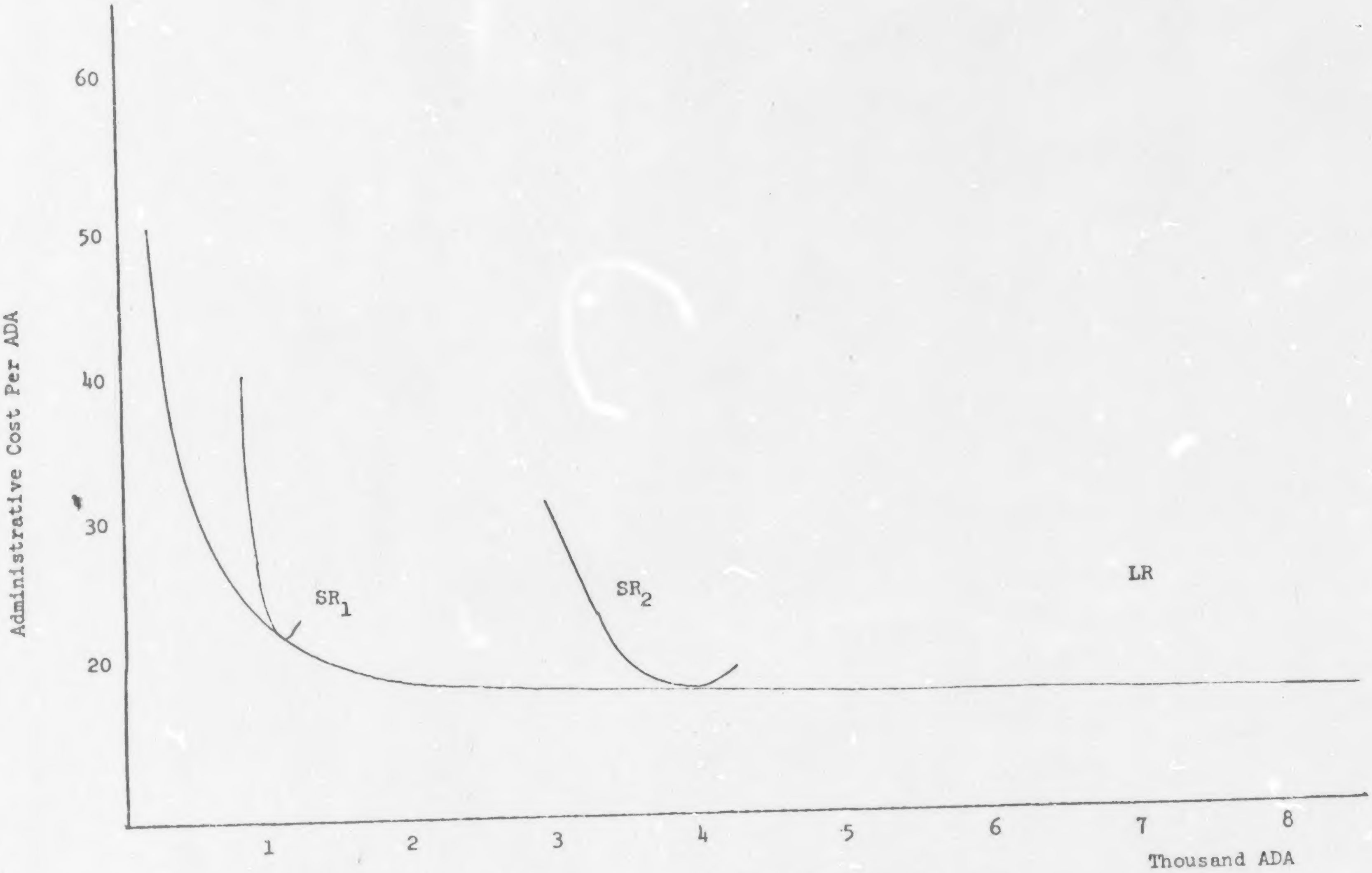

Figure 1. Average Cost of Administrative Services Per ADA

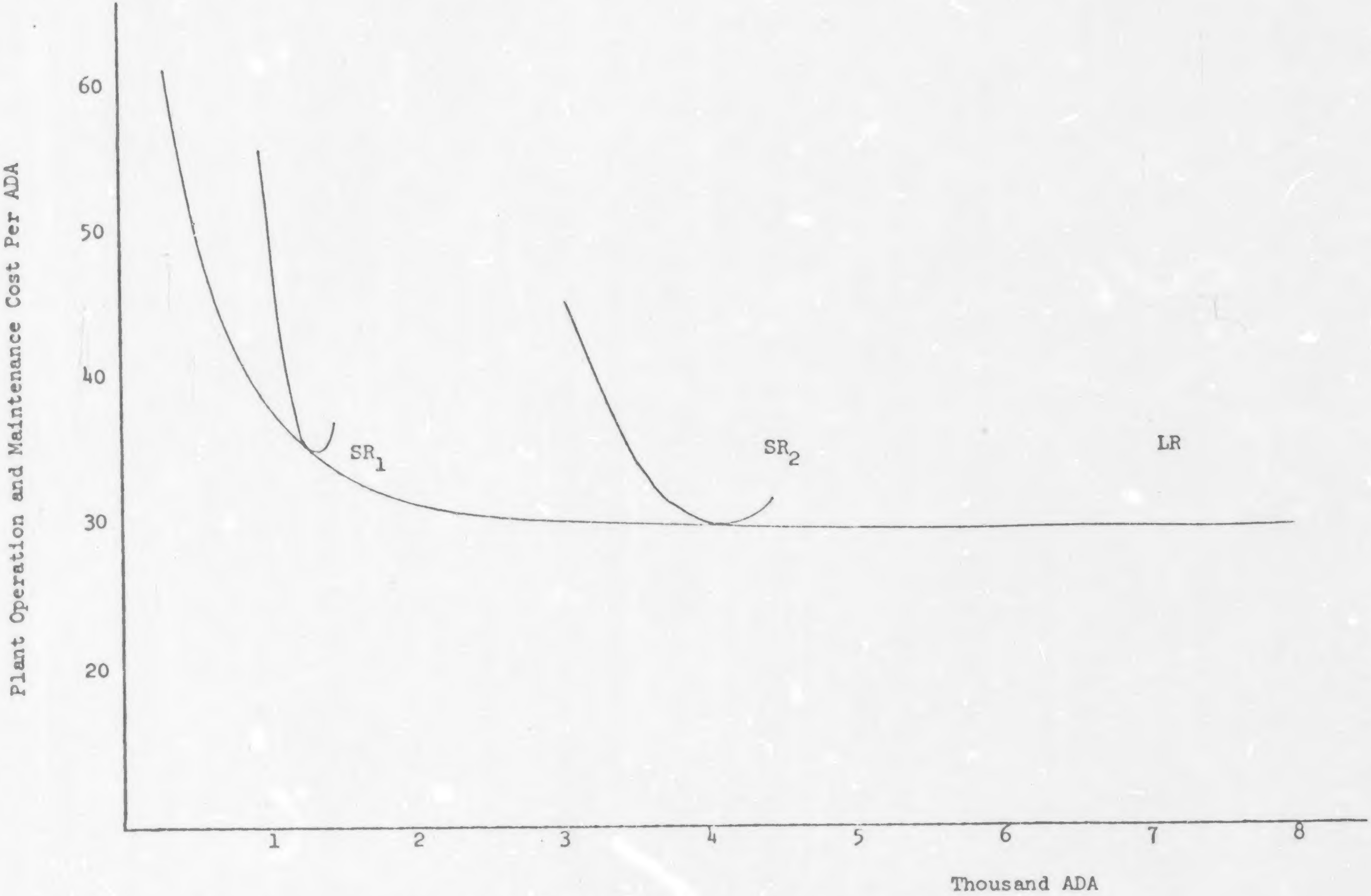

Figure 2. Average Cost of Plant Operation and Maintenance Per ADA

teachers constant, which causes more than the optimum number of classes to be in operation at smaller enrollments. These short-run curves show that only minor deviations in plant operation may cause major deviations from minimum attainable costs.

Instruction

Instruction consists of those activities dealing directly with the teaching of students. These are the activities of the teacher, principal and guidance personnel. Attendant costs include salaries of secretarial and clerical assistants, textbooks, school libraries, audiovisual materials and teaching supplies.

Instructional costs vary because of differences in the quality of program offerings. To make a valid comparison of costs among schools of different sizes, the program quality must be held constant. For this analysis the high school course offerings were standardized according to number and type of vocational and nonvocational courses offered.

The standard program of studies presented in Table 1 was developed from the actual courses offered by the districts in the sample which had an adequate[1/] program of both vocational and nonvocational courses. This program was designed as a minimum standard of broad exposure to the general subject areas. The most frequently offered courses within each subject area are also presented in the table. The course offerings may be expanded as the initial classes of a subject area reach optimal size and new classes are added. Percentage of enrollment in each subject area was also computed from the enrollment of those providing an adequate program. Instructional costs were calculated by incrementing ADA and distributing high school students among courses as prescribed in Table 1.

The number of high school teachers was calculated from the number of classes required to meet the standard program. The number of elementary and junior high teachers was based on ADA and a student-teacher ratio of 27-1, which is the state average. Cost calculations are based on the assumption that two courses can be combined in a single classroom under one teacher until the number of students in combined courses exceed the maximum class size. Teacher salaries were based on average state salaries of $7,137 for high school teachers and $6,834 for elementary and junior high teachers.

Salaries for principals and secretaries within the schools were also considered. The Oklahoma average full-time equivalent principal-to-ADA ratio is 3:1000. This ratio includes both principals and

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[1/] Schools offering adequate programs had at least 38 units of vocational and nonvocational courses which is necessary to be accredited by the North Central Association.

TABLE 1

STANDARD PROGRAM OF COURSE OFFERINGS

Courses	Credit Units	Credit Units By Subject Area	Maximum No. Of Students Per Class	Percentage Enrolled In Subject Area
Language Arts		6	35	31.428
English I-IV	4			
Speech	1			
Library Science	1			
Mathematics		4	28	14.663
General Math	1			
Algebra I-II	2			
Plane Geometry	1/2			
Trigonometry	1/2			
Social Studies		4	35	5.986
American History	1			
World History	1			
Government	1/2			
Oklahoma History	1/2			
Sociology	1/2			
Psychology	1/2			
Science		4	22	10.767
Biology	1			
Chemistry	1			
General Science	1			
Physics	1			
Business Education		5	30	7.916
Accounting	1			
Business Law	1			
General Business	1			
Shorthand	1			
Typing	1			
Fine Arts		3	32	12.336
Arts	1			
Crafts	1			
Music	1			
Health and Safety		2	35	7.792
Driver Education	1/2			
Health Education	1/2			
Physical Education	1			
Foreign Language		2	30	2.108
French	1			
Latin	1			
Vocational Education		8	22	16.631
Vocational Agric.	2			
Home Economics	2			
Auto Mechanics	2			
Cosmetology	1			
Drafting	1			
TOTAL CREDIT UNITS		38		

assistant principals. Adequate full-time equivalent guidance counselors and secretarial personnel-to-ADA ratios are 4:1000 and 3:1000, respectively. The average salaries for principals, guidance counselors, and secretaries were $9,028, $8,657, and $4,000, respectively. The average cost of instruction for elementary and secondary education are shown in Figures 3 and 4.

Buildings

Construction costs for buildings consist of all expenditures for general construction; installation of plumbing, heating, lighting, architectural services; paint; and any other costs connected with the planning of buildings.

Average costs derived from Appendix equations (3) and (4) of building construction for high schools and elementary schools are shown in Figures 5 and 6. In computing annual investment and depreciation, it was estimated that a school building loses 80 percent of its value in 50 years. The average cost of construction was put on an annual basis by considering depreciation, insurance, and interest on investment.

Equipment

Cost of equipment includes expenditure for items of furniture, furnishings, and machinery that are not integral parts of the building. Some examples of equipment include desks, chairs, tables, bookcases, musical instruments, shop machinery and tools, and typewriters. Some economies of size in providing equipment are realized given constant quality of equipment. The average cost curves of equipment for elementary and secondary education (excluding vocational equipment) are shown in Figures 7 and 8 and are derived from Appendix equations (5) and (6).

The cost of vocational equipment varies by the curriculum offered as shown in Table 2. Equipment for an auto mechanics course with 30 students would cost $25,040.00 (1 x 18,270 + (30/3) x 500 + (30/10) x 490) These programs show significant economies associated with large classes. For example, the cost per student of an auto mechanics class with only 10 students is $208.60 compared to $83.47 for a class with 30 students.

The cost of equipment per ADA was based on the number of elementary students, secondary students, and secondary vocational students by courses. These costs were converted to annual costs by taking into consideration depreciation, insurance, and interest of investment. The equipment's operating life was assumed to be 25 years for nonvocational equipment and 10 years for vocational equipment.

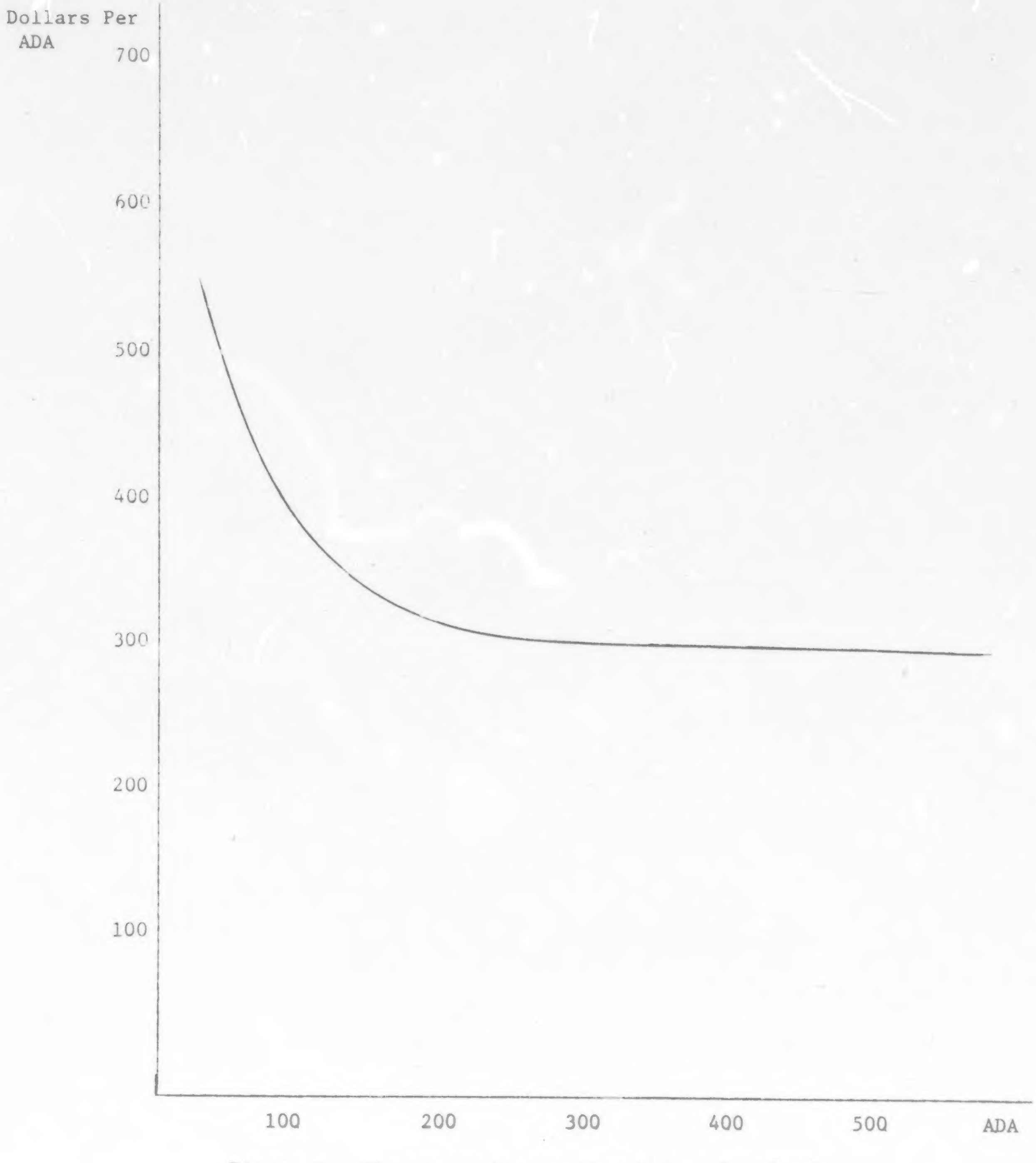

Figure 3. Elementary Instructional Cost Per Pupil

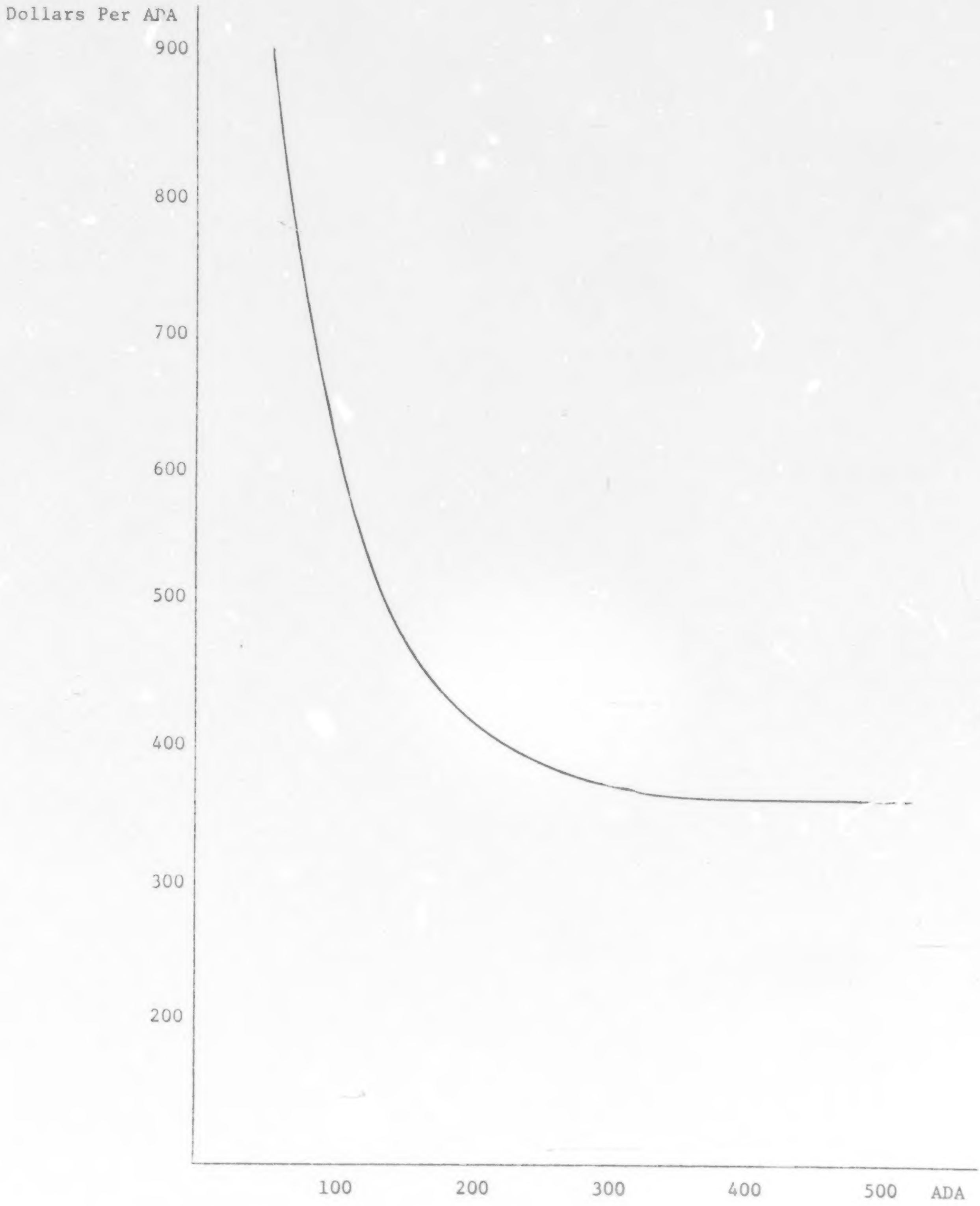

Figure 4. High School Instructional Cost Per Pupil

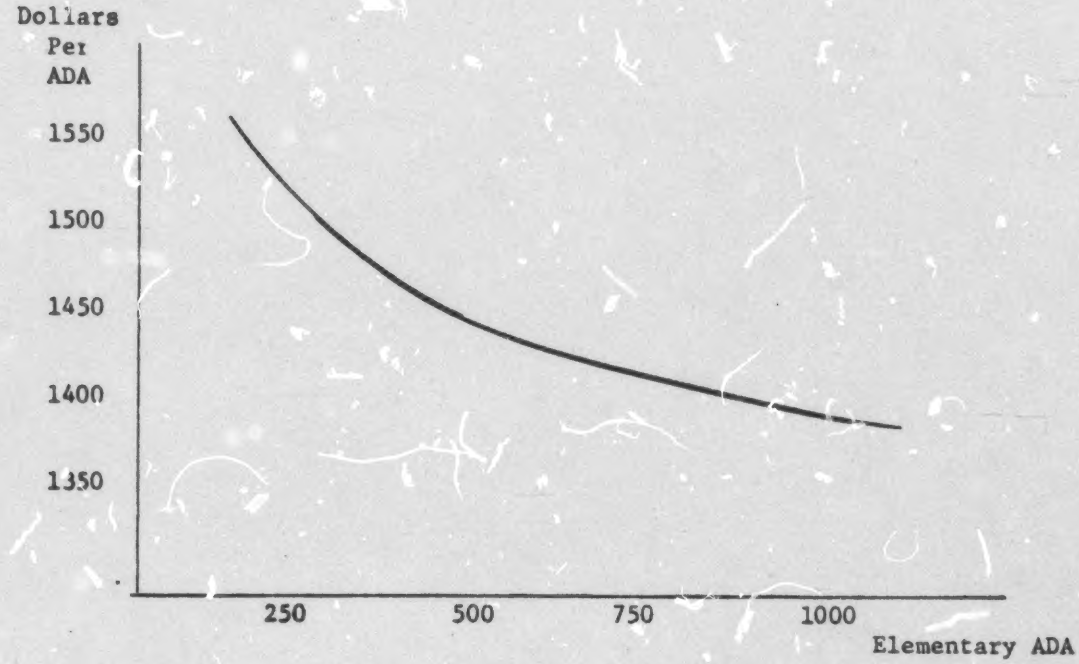

Figure 5. Average Cost Per ADA of Buildings for Elementary School

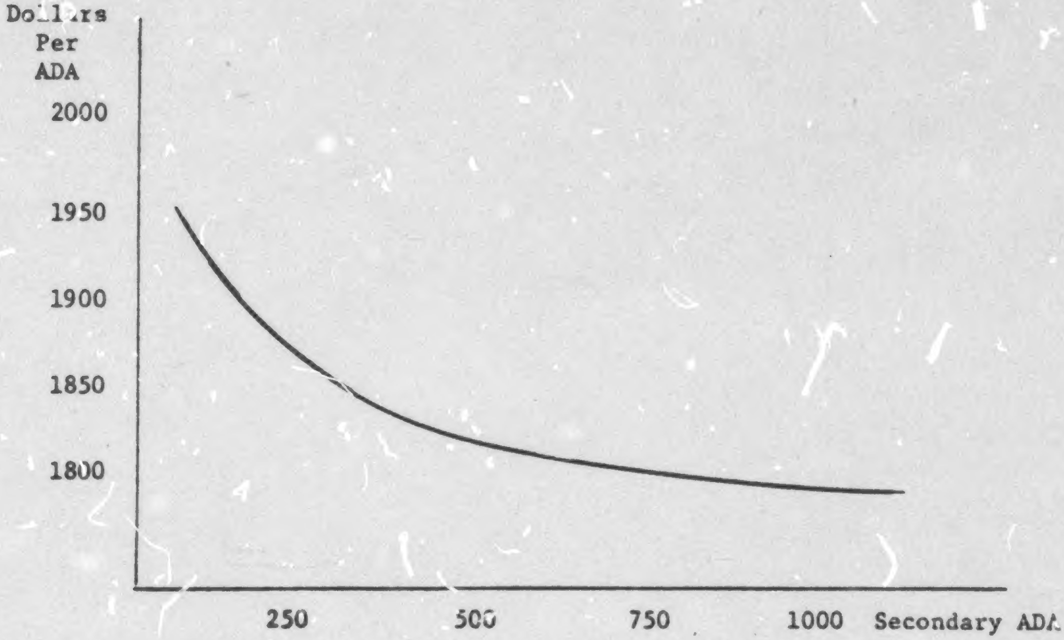

Figure 6. Average Cost Per ADA of Buildings for Secondary School

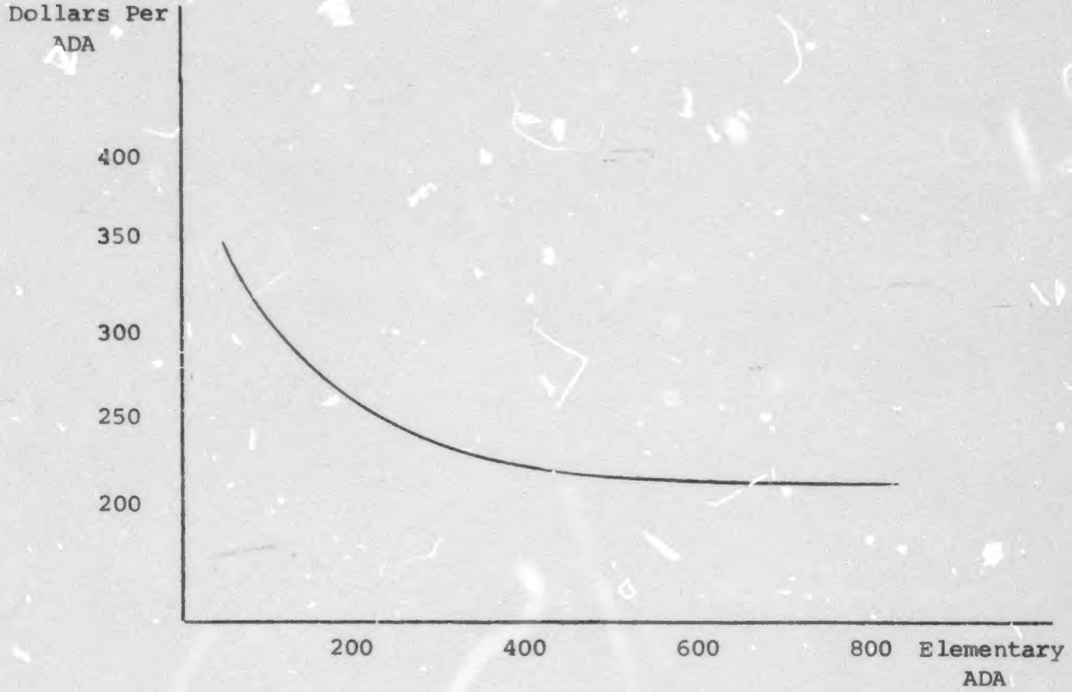

Figure 7. Average Cost Per ADA of Equipment for Elementary School

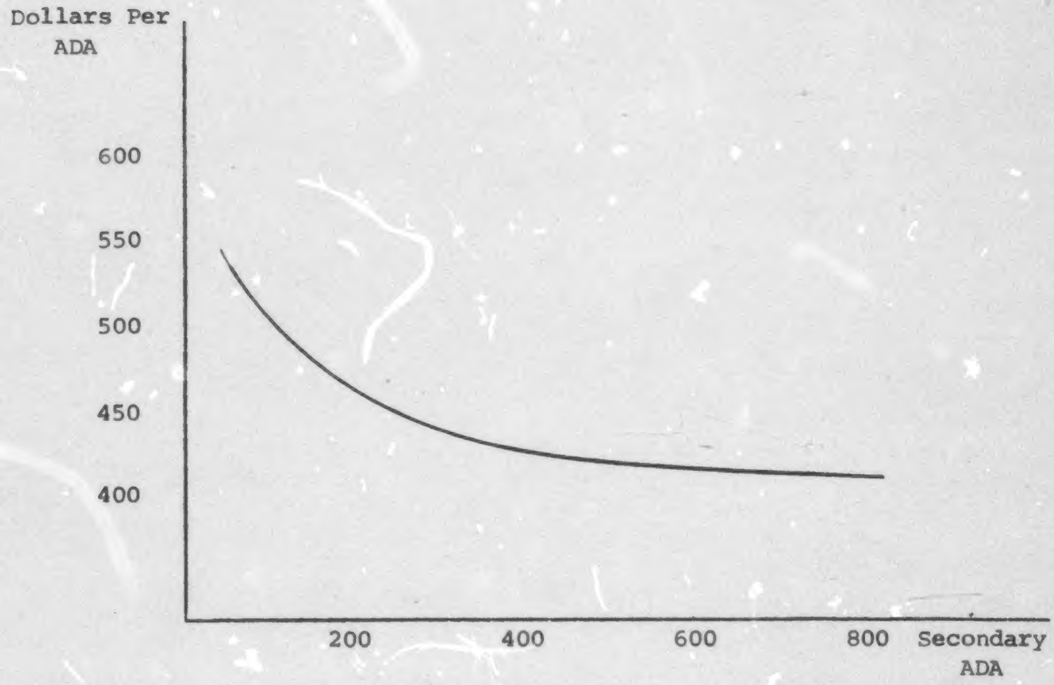

Figure 8. Average Cost Per ADA of Equipment for Secondary School

Table 2. Cost of Equipment and Supplies by Vocational Program.

Course	Required for Every	Cost of Equipment	Cost of Supplies Per Person
Auto Mechanics			30.09
	Class	$18,270	
	3 Persons	500	
	10 Persons	590	
Cosmetology			24.09
	Class	2,830	
	3 Persons	1,200	
	8 Persons	200	
Drafting			8.98
	Class	7,930	
	1 Person	490	
Air-Conditioning and Refrigeration			34.04
	Class	6,185	
	1 Person	160	
	3 Persons	140	
Welding			35.66
	Class	15,288	
	5 Persons	860	
	8 Persons	2,410	
Home Economics			15.00
	Class	1,716	
	2 Persons	300	
	6 Persons	1,215	
Vocational Agriculture			30.00
	Class	5,000	
	6 Persons	1,500	

Transportation

In Oklahoma public schools districts, public transportation generally is provided for students whose residence is not within 1.5 miles of the school attended. In so far as possible, buses are approved to go at least within one-half mile of each pupil's home. Transportation costs in rural areas are particularly importance since students are so dispersed and school districts are so large.

In many districts the most expensive transportation item is the drivers' salaries. The average salary per mile of bus route is 75.94 dollars with a standard deviation of 38.129 dollars. There is no stable relationship in the state between bus drivers' salaries and either miles or student-miles. District salary schedules are typically based on a school district's wealth and local wage rates rather than a uniform state salary schedule. In computing transportation cost, the state's average salary was used.

The least expensive combination of body and chassis was selected for each size of bus. The list prices of buses by size are presented in Table 3. Depreciation costs were computed from these list prices and a seven-year operating life, the state average. The approximate cost per mile traveled was derived from the cost per mile of bus route using the number of days traveled (180) and the number of times per day the bus route is covered.

The cost of operation and maintenance is one of the largest items of transportation costs, ranking third among all items. Cost of operation includes expenditures for gasoline and lubricants. With the many starts and stops that school buses must make, their gas mileage is low. A 30-passenger bus in rural Oklahoma typically gets 10 miles per gallon. The cost of lubricants were assumed to be 15 percent of the fuel cost. Maintenance includes cost of material and labor for repairs, equipment replacement such as tires, as well as the cost of overhauls. The costs of operation and maintenance are also presented in Table 3.

Insurance and interest on investment are the last components of transportation costs. The charge for interest was based on the average annual investment and a six percent interest rate. The cost of insurance was based on a typical package of comprehensive, collision, and liability insurance. The liability coverage had 100-300-25 in thousand dollars of individual bodily injury, total bodily injury, and property damage, respectively.

All costs of operating school buses in Table 3 were combined to derive the average cost of transporting students by various student densities and district sizes. School buses were assumed to come at least within one-half mile of every point in the district. Average cost curves for different student densities are presented in Figure 9.

OPTIMUM SCHOOL DISTRICT SIZE

Average cost curves can be used in decision making to select the optimum school district size. As seen from the cost curves presented in this study, there are certain tradeoffs associated with increasing the size of the district. Cost economies in instruction and attendance functions accrue from larger numbers of students, but cost diseconomies from transportation arise as more and more students have to be transferred into school. This relationship of cost economies versus cost diseconomies is depicted in Figure 10. The average educational cost includes the cost of administration, plant operations and maintenance, annual costs of plant and equipment, and instruction for the standard program. Most major economies of size have been achieved when enrollment reaches 800 ADA. The average transportation cost curve shown in Figure 10 assumes a student density of 1.8 transported students per square mile.

The average transportation and educational cost curves were added together to get the average cost of all the school district's functions

Table 3. Fixed and Variable Cost of Operating School Buses, by Size of Bus.

Seating Capacity	List Price	Depreciation Per Mile of Bus Route	Interest on Average Annual Investment	Cost of Operation Per Mile of Bus Route	Cost of Maintenance Per Mile of Bus Route	Annual Cost of Insurance
30	$6,557	$36.4323	$216.38	$16.6422	$12.4409	$218.95
36	6,695	37.1990	220.94	18.7608	12.7266	226.52
42	7,172	39.8494	230.68	20.0715	13.9707	237.11
48	7,328	40.7162	241.82	21.1810	14.1220	244.84
54	7,719	42.8886	254.73	22.0888	14.9291	254.65
60	8,491	47.1780	280.20	22.9965	16.8120	267.88
66	8,851	49.1783	292.08	23.7026	17.4845	277.42

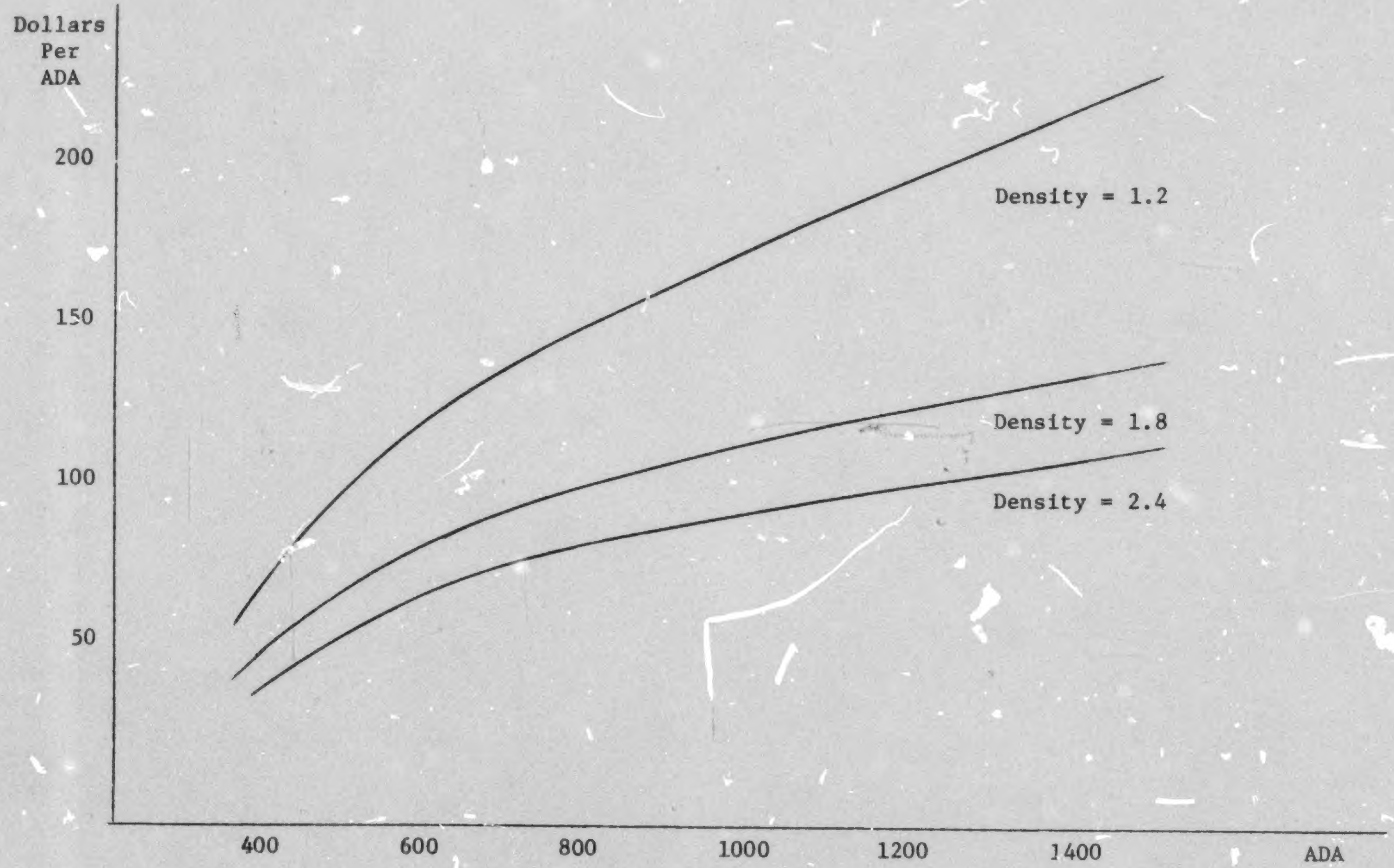

Figure 9. Average Cost Per ADA for Transportation by Student Density Assuming 265 Nontransported ADA

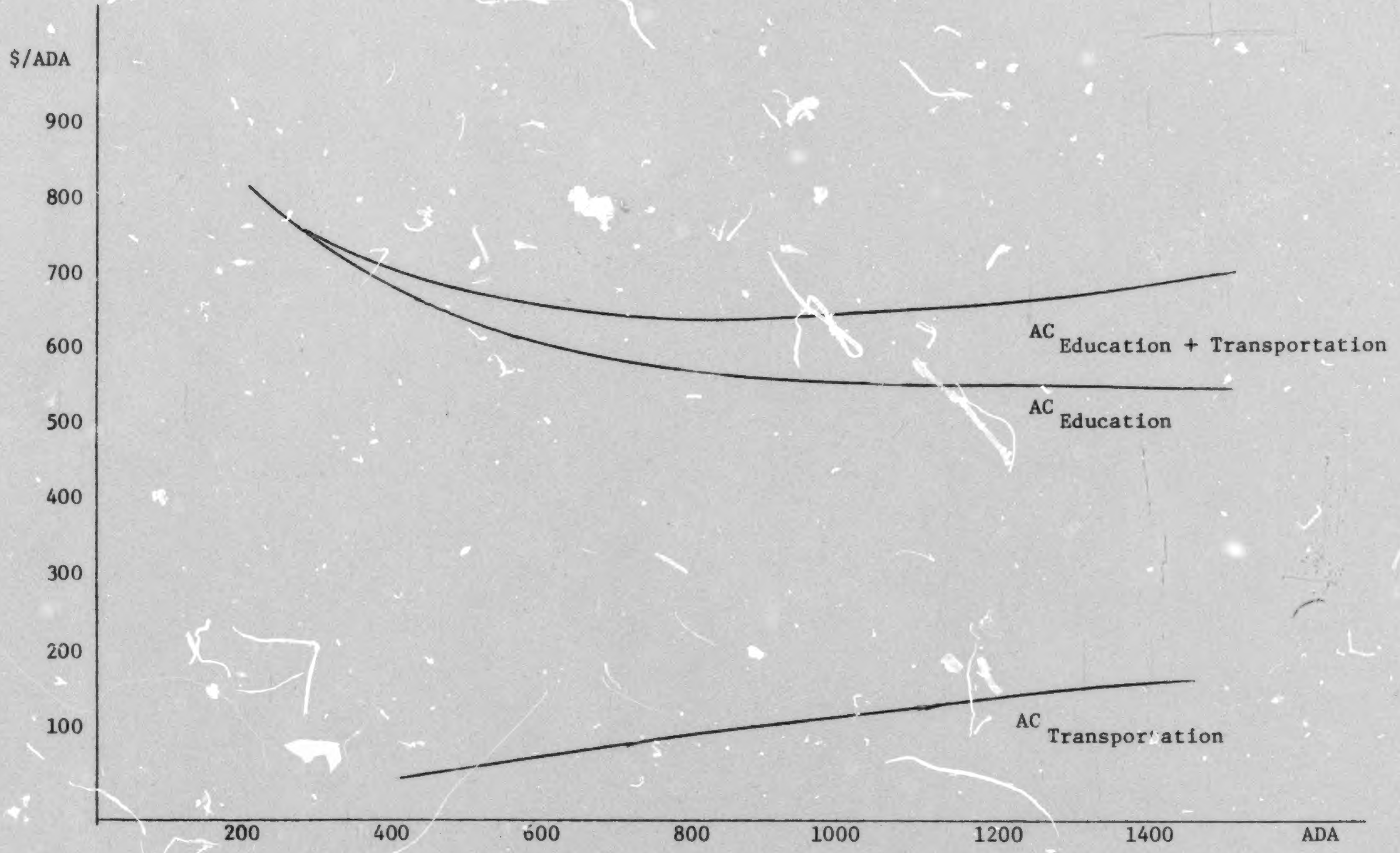

Figure 10. Average Cost of Education and Transportation Per ADA for a School District with a Student Density of 1.8 Transported Students Per Square Mile

(Figure 10). This curve's minimum occurs at 675 ADA. However, the curve is very flat between 400 and 1,100 ADA. School districts can operate anywhere within this range without significant differences in per-unit costs. School districts operating outside this range face substantially higher per-unit costs. Although the average cost curves considered here are for the single year 1969-70, they can be used in long-run problems. For one thing, minor variations from the optimum size cause only slight increases in costs. Secondly, although inflation is likely to shift both the transportation and educational cost curves up, it is not certain that the optimum size will shift either to the right or left.

CONCLUSIONS

An examination of a school district's long-run average cost curve provides some insight into how large the school district should be. The optimum size of school district is defined as that which has minimum long-run average costs. The prescription for optimal economic operation, therefore, calls for the school district to combine resources in a least-cost manner so as to operate on the long-run average cost curve and to operate at the optimum size of school district in order to achieve minimum per-unit cost.

LITERATURE CITED

[1] "Cost of Construction." School Management. XIV (July, 1970), pp. 15-35.

[2] Isard, Walter and Robert E. Coughlin. Municipal Costs and Revenues Resulting from Community Growth. Wellesley, Mass.: Chandler-Davis Publishing Company, 1957, pp. 71-74.

APPENDIX: COST EQUATIONS

Administration

A long-run average cost curve was estimated for administrative services using multiple regression. Standard errors are shown in parentheses below the regression coefficients. The computed t-values indicate that the regression coefficients are all significant at the .05 level.

$$(1)\quad AD = 311.743 + \underset{(.312)}{.528}\,ACH - \underset{(4.730)}{25.391}\,PTR + \underset{(.097)}{.513}\,(PTR)^2 + \underset{(6.679)}{6.694}\,(1/ADA)$$

$$R^2 = .937$$

The variables are as follows:

AD is administrative costs per student in average daily attendance;
ACH is average eleventh-grade composite achievement score;
PTR is pupil-teacher ratio; and
ADA is average daily attendance in 1,000 units.

School Plant Operation and Maintenance

Costs of operation and maintenance of plant are related to student achievement, pupil-teacher ratio and ADA in equation (2). The regression coefficients were significant at the .05 level.

$$(2)\quad POM = 32.073 + \underset{(.380)}{1.612}\,ACH - \underset{(8.519)}{16.516}\,PTR + \underset{(.179)}{.298}\,(PTR)^2 + \underset{(.193)}{.338}\,ADA$$

$$R^2 = .852$$

POM is average cost of plant operation and maintenance per pupil in ADA. Results indicate initial economies and then slight diseconomies as school size (ADA) is increased. Initial economies accrue from more intensive utilization of plant, while diseconomies accrue from servicing a larger number of school plants within a given district. POM declines at a decreasing rate with increases in the class size.

Buildings

Data on recently built schools, reported in School Management, give the general cost of construction by size of school district and state [1, pp. 15-36]. These data were used to derive equations (3) and (4) to give a representative picture of the size-cost relationship in building construction in Oklahoma.

(3) $CON_E = 1,428.944 - .057 (ADA_E) + 22,488.895 (1/ADA_E)$

(4) $CON_S = 1,909.770 - .234 (ADA_S) + 1,845.033 (1/ADA_S)$

The variables are as follows:

CON is construction cost per ADA,
E is elementary school, and
S is secondary school.

Equipment

Equation (5) and (6) give the average cost of equipment for elementary and secondary education, excluding vocational equipment (Isard and Coughlin, [2, pp. 71-74]). These equations were adjusted to 1969-70 price levels by the Bureau of Labor Statistics commercial furniture price index.

(5) $EQP_E = 238.520 - 4404.357 (1/ADA_E)$

(6) $EQP_S = 406.735 - 7919.032 (1/ADA_S)$

EQP is equipment cost per ADA.

PLANNING EDUCATIONAL SERVICES FOR RURAL AREAS

Fred White and Luther Tweeten*

Quality schooling is essential to the well being of the state's rural youth whether they remain in their home community or leave. Inadequate schooling disadvantages the rural youth who must compete with youth trained in quality schools for jobs or for a university degree. Inadequate schools disadvantage a rural area that would attract a progressive industry. Outmigration has weakened the economic base of many rural communities, making it difficult to finance quality schooling. This report shows ways to provide quality schooling while keeping costs down.

PROBLEM

A statewide survey of student needs in Oklahoma measured quality differences between rural and urban areas. Data reveal that urban school districts generally provide better facilities and equipment. Urban schools pay higher salaries which help attract quality teachers and supporting personnel. Large urban schools provide greater specialization--each teacher instructs classes in which he is best qualified. Urban high schools offer a greater variety in course offerings, particularly vocational, science and fine arts courses.

Oklahoma students from farms, ranches and small towns consistently ranked below students of middle and large cities on achievement tests in each grade level examined: 4, 8 and 11. These scores suggest that elementary and secondary students in urban schools were receiving a higher quality education than students in rural schools. Achievement tests leave much to be desired, but are a good predictor of later success in higher education.

PROBLEM SOLUTION

Rural youth are entitled to quality education. Two ways to improve rural education are to (a) improve the quality and efficiency of existing schools, and (b) combine existing schools in instances where quality cannot be provided at reasonable cost because of few students.

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*Respectively, former Research Assistant and Regents Professor, Department of Agricultural Economics, Oklahoma State University.

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Improving Schools

The school curriculum should be broad enough to develop individuals to their fullest capacity. Some students may wish to pursue a college preparatory program while others may wish to obtain vocational training. Still others may have problems such as reading difficulties, speech impediments, and mental retardation. Specialized personnel to handle these problems are an important part of a high-quality educational program.

Many schools serve rural areas so sparsely populated that only small schools are possible. The cost associated with transporting students in these areas outweighs any possible savings in instructional costs achieved by having more students and larger classes. However, a wide range of services may be provided efficiently by cooperation with neighboring school districts. Such cooperation can provide specialized services which could not be supplied fully even by reorganized school districts. These interdistrict programs can include library and audio-visual services: reading, guidance and other qualified specialists; as well as vocational programs.

Specialists may travel from school to school, or some students may be transferred to an area vocational training school for part of their training. Figure 1 shows how a school district's average costs can be affected by cooperation. Curve AC_1 is the average cost of secondary instruction with the high school providing its own vocational training program. All significant size economies on this curve are not reached until the high school enrollment is about 400 pupils. When the high school does not provide its own vocatioanl training program, its average cost curve is AC_2. Curve AC_3, on the other hand, is curve AC_2 plus a fee for instructional expenditures and transfer costs to an area vocational training school. Although AC_1 and AC_3 show approximately the same cost of providing a vocational training program after major economies of size are achieved, the costs are very different for smaller enrollments. It is much less expensive for a high school with under 300 pupils to send its students to an area vocational training school than to provide its own program.

School District Reorganization

Even with cooperation, many small school districts are financially unable to support an adequate instructional program. Schools must expand in size to operate efficiently and to provide an adequate educational program. Lower costs associated with higher enrollments are achieved from economies in employing administrative and supplemental personnel. In addition, there are important economies in building construction, plant operation and maintenance, and purchase of equipment. But the main objective of reorganization is to develop and provide a varied and high-quality educational program.

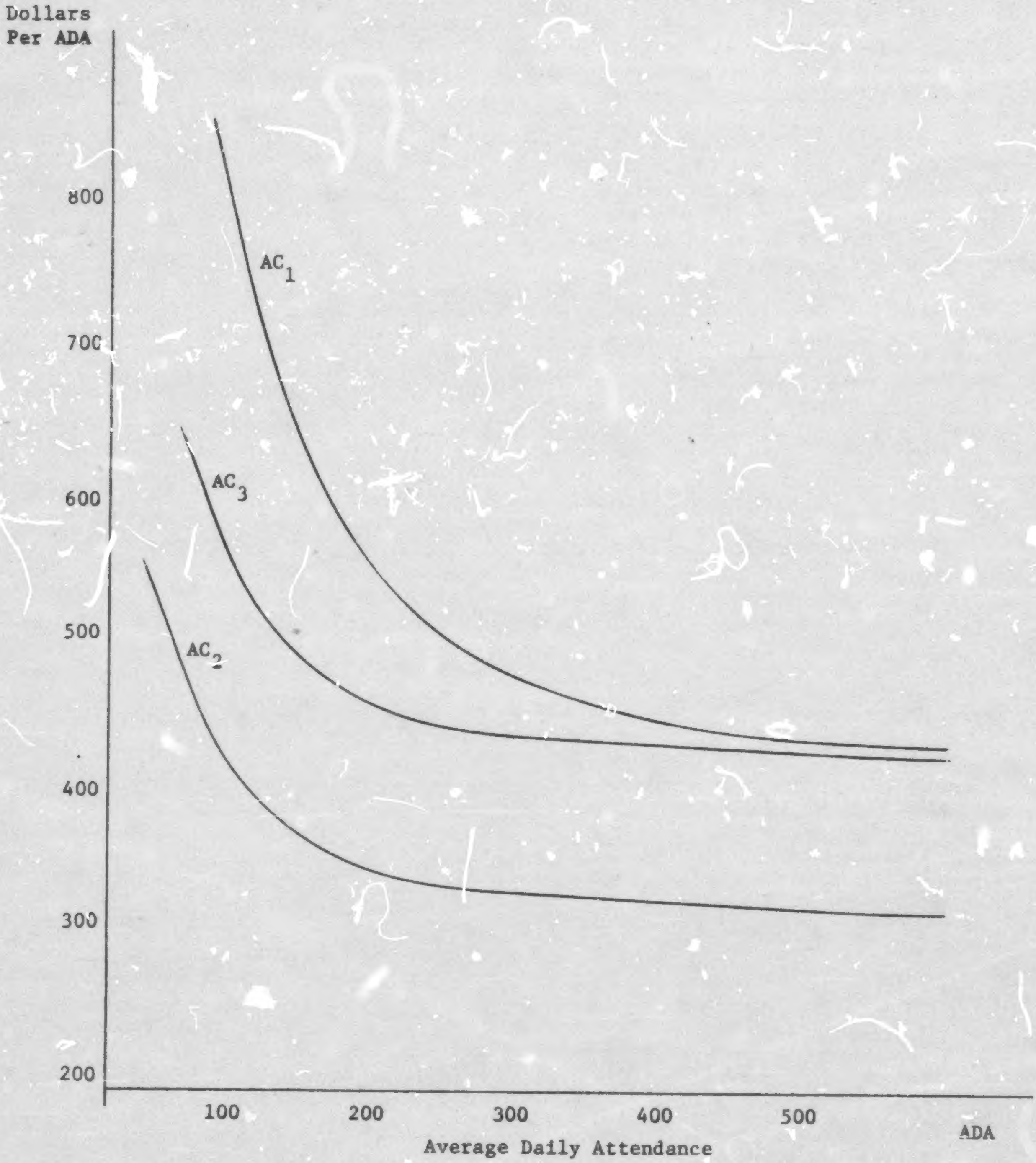

Figure 1. High School Instructional Cost Per Pupil

The model described below is a procedure to minimize combined transfer and educational costs. It considers all costs involved in educating elementary and secondary students who live at various locations. Similar models can be applied to a wide range of programs dealing with location of community services.

Given the communities in which students live, the number of students in each community, and the location of possible school sites, the problem is to determine the number, size and location of schools that will minimize the combined costs of transferring and educating the students in the area.

The first step in minimizing the combined costs is to obtain a transfer cost matrix. This matrix shows the cost of transferring a student from each origin to each possible school site. A transfer-cost matrix for three communities is shown below. The second number in the first row shows that it costs $100 to transfer one student from community X to school site Y. It costs $70 to transfer each student from site X to site Z or from site Z to site X.

Transfer Costs

Origin	Possible School Site X	 Y	 Z
		Dollars	
X	0	100	70
Y	100	0	110
Z	70	110	0

The combined transfer and educational cost is expressed by adding to each column of the transfer cost matrix the school instructional cost applicable for each particular size of school. In Oklahoma, let the current operating cost of offering an adequate instructional program be:

$$TC = 50,000 + 400\ ADA$$

where TC is total educational cost in dollars, and ADA is number of students in average daily attendance. Thus $400 is added to each element in the transfer cost matrix to form the transfer and educational cost martix.

For simplicity, assume that each of the three communities has 100 students. If one school is to serve the entire area, there are three

Transfer and Educational Costs

Origin	Possible School Site X	Y	Z
		Dollars	
X	400	500	470
Y	500	400	510
X	470	510	400

possible locations: X, Y, and Z. First, suppose that X is the only school in the area. The variable cost of transferring the 100 students in community Z to school X and educating them in school X is found by multiplying the number of students in community Z (100) by the appropriate transfer and educational costs per student (470 dollars). The transfer and educational costs for the students of communities X and Y going to school X are also computed. The total variable cost (TVC_X) for school X to serve the area is the dollar cost of transferring to school X and educating the students of each community in school X:

$$TVC_X = (100 \times 400) + (100 \times 500) + (100 \times 470) = 137{,}000.$$

The constant of the educational cost equation representing fixed costs, $50,000 in this case, must be added to the above cost to get total cost of education and transfer for school X. Similar costs must be computed for schools Y and Z. The total costs for schools X, Y, and Z are 187, 191, and 188 thousand dollars, respectively. These three total costs are compared to find the minimum cost for one school, which is 187 thousand dollars for school X.

If two schools are to operate in the three communities, there are three possible combinations of locations: XY, XZ, and YZ. If locations X and Y are being considered, each community's minimized combined transfer-education costs per student is obtained by scanning the first two columns of the transfer and educational cost matrix and selecting the minimum element in each row. This procedure yields minimum transfer and educational cost of 400, 400, and 470 for communities X, Y, and Z, respectively. Multiplying the number of students in each community by the appropriate cost yields minimum variable transfer and educational costs given two schools located at communities X and Y. Total costs are obtained by adding the fixed costs for the two schools, which is 100,000 in this case. Minimum cost of two schools, 227 thousand dollars, occurs when the schools are located at XY, or YZ.

The procedure described for computing minimum transfer and educational costs for each number of schools is repeated for every possible combination of school sites. The appropriate fixed costs for each school location are added to the variable costs to obtain total combined transfer and educational costs. From these total combined transfer and educational costs, the minimum is selected. By performing these operations for every possible number of schools, the total cost function is traced out. The lowest cost, 187 thousand dollars, is achieved by having one school at site X.

An Empirical Application

This model was applied in a rural Oklahoma county to find the least cost organization of schools. The county currently has six independent school districts. For communities A through F, there are 266, 837, 214, 831, 261 and 44 students, respectively. The area map is shown in Figure 2. Annual transfer cost per student is $5 per mile.

Some variation in instructional costs may result from the wide differences in the quality of program offerings. In determining the size-cost relationship, the program quality must be held constant among schools of different sizes. For this analysis the course offerings in each high school were standardized to an adequate program of both academic and vocational courses. Actual costs may vary from these standardized costs according to differences in quality. Assuming a standard program, the educational cost equation is the same as before, with an intercept or fixed cost of 50,000 dollars and a slope or variable cost per ADA of 400 dollars. This formulation does not include the cost of building and equipment.

The minimization procedure outlined above was used to find the optimum organization of school districts presented in Table 1. The minimum combined transfer and educational cost occurs when there are two schools located in communities B and D. The current annual cost of the present pattern is 134 thousand dollars more than this least-cost combination. Some costs of reorganization, such as the discomfort of a longer bus ride or the loss of sports in four schools, are not quantifiable. These nonquantifiable costs must be balanced against savings of $134 thousand and improved quality of schooling before a final decision to reorganize is made.

Table 1. Costs and Locations for Optimum School District Organizations for Various Numbers of Schools.

Number of Schools	Optimum Locations	Educational Costs	Transfer Costs	Total Costs
		Thousand dollars		
1	C	1191	138	1329
2	B,D	1241	66	1307
3	B,D,F	1291	41	1332
4	B,D,E,F	1341	19	1360
5	A,B,D,E,F	1391	4	1395
6	A,B,C,D,E,F	1441	0	1441

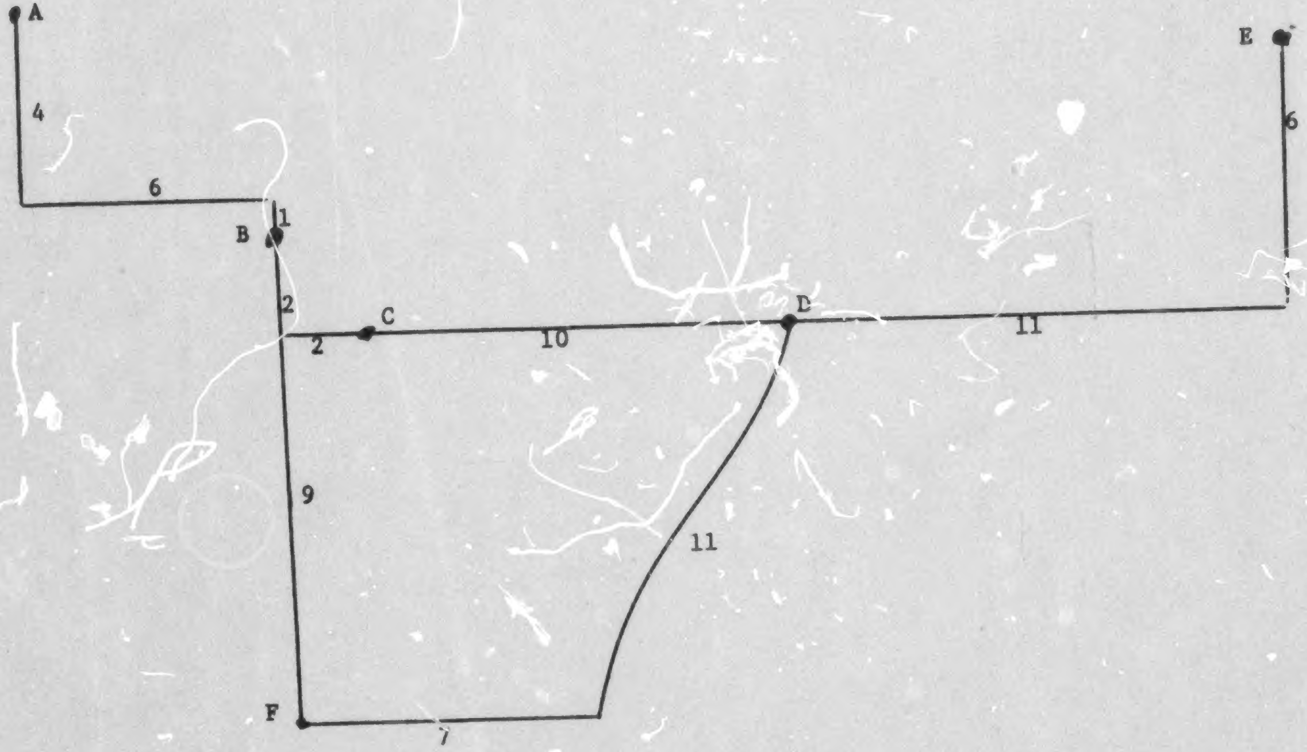
A
4
6
B
1
2
C
2
10
D
11
E
6
9
11
F
7

Figure 2. Map of a Rural Oklahoma County Showing Miles Between Communities

CONCLUSIONS

Changing employment opportunities have caused some rural communities to decline and others to expand in population. These population shifts require changes in rural institutions such as school districts. Meanwhile, adequate schooling requires increasing diversity and quality in the program. Although school districts are in a process of change, many have been slow to meet new demands. Rural communities frequently lack resources and an efficient allocation of these resources to provide adequate schools. Cooperation with other school districts may be necessary to share needed specialized services at a reasonable cost. If this approach is not sufficient, school district reorganization may be necessary to reduce costs and provide a quality program. Cost estimates reported herein show that savings from reorganization can be substantial while the quality of the school is increased.

PUBLIC HEALTH SERVICES

Ivan Hanson*

Health services are a relatively new subject to be discussed in a rural planning workshop. During the decade of the 60's, it was brought out of the realm of a limited few and made a public issue to be discussed and decided upon along with other aspects of development. Planners have always recognized that health services are among the essential parts of a growing community, along with other parts of the social infrastructure such as schools, water, and sewers. traditionally, however, we have considered the building of a hospital an adequate investment in community health.

But that has all changed now. We have discovered that building a hospital isn't enough, because sometimes we can't find the doctors to staff it; so it stands empty and unused. We also have discovered that even if a community has a hospital it doesn't necessarily mean that all residents get adequate medical care.

Where does this all leave us?

There are some new dimensions being developed as a part of community planning. Health planning is emerging as a special field--people are being formally trained as health planners, and governmental monies are being allocated to do planning at local and state levels. Second, we are on the threshold of major changes in financing medical care. Legislation is now being considered in Congress that will greatly change both the financing and delivery patterns.

The objective of this paper is to acquaint people who are not directly involved with the health field with the nature of health planning programs and how they are gradually changing the concept of community health.

COSTS AND DISTRIBUTION OF HEALTH SERVICES

Rising Costs

Spiraling costs of medical care are one of the principal reasons why new attention is being given to the medical system. Medical costs increased by about 60 percent during the decade of the 60's while other consumer items increased by about 30 percent.

The largest single item of expenditures is hospital care, which represents 43 percent of the average personal health care outlay. This item rises more rapidly than any other, growing 16 percent per year. Payroll costs account for three-fifths of hospital bills and are the largest single item responsible for spiraling hospital costs. Wages for hospital employees had lagged behind other sectors for many years, and their inclusion under minimum wage provisions in 1967 reflects this jump in payroll. Increased unionization of these employees also accounts for part of their sharp rises in wages.

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*Associate Professor, Department of Agricultural Economics, Oklahoma State University.

The next largest identifiable item in rising medical costs is physicians' services, which is about 23 percent of medical expenditure. This trend is traced to the increase in fees in anticipation of Medicare and Medicaid in 1966 and to increased demand for services without a corresponding increase of physicians [8, p. 3].

The distribution of medical costs by category and age group is shown in Table 1. Note that hospital care is the largest expenditure category for both the 19-64 and the 65 and over age groups. For persons under 19, physicians' services are the largest block with 33 percent of all expenditures.

Table 1. Percentage distribution of personal medical expenditures, by type of expenditure and age group, United States, FY 69.

	Percentage distribution			
Type of expenditure	All ages	Under 19	19-64	65 and over
Amount--FY 1969--(in millions)	$52,564	$8,415	$30,659	$13,490
Percentage distribution	100.0	100.0	100.0	100.0
Hospital care	42.9	24.6	45.4	48.4
Physicians' services	22.7	33.4	22.9	15.5
Other professional services	9.7	15.2	10.8	4.0
Drugs and drug sundries	11.9	13.0	11.9	11.5
Nursing home care	4.6	.2	.7	16.1
Other health services	8.2	13.6	8.3	4.5

Source: [8, p. 8].

The average person incurred medical expenditures of $280 in 1970, and that was nearly double the $145 per person in 1960. The elderly, persons 65 and over, had much higher expenses, averaging $790 per person. Young persons, such as those under 19 years of age spent only $123, and the majority of the population in the in-between category of 19 to 64 years paid an average of $296 [8].

Distribution of Services

Congress and the President have stated a national goal of the highest level of health attainable for everyone [25]. Yet an examination of several kinds of data reveals that people who are poor, non-white, or live in rural areas have higher rates of diseases and death and less access to medical services.

One way of examining the impact of income on health status of persons is the rate at which they use physician services. Table 2 indicates that persons with high incomes tend to visit physicians oftener than do people with low incomes. This is particularly true for non-white persons. This generalization holds throughout the range of all income levels for non-white persons. Whites have a slightly higher rate of use of physician services in the under $2,000 income category than for incomes in the $2,000 to $9,999 category, and at all income levels, whites visit physicians more often than non-whites.

Table 2. Physician visits per person per year by family income and color, July 1963-June 1964.

Family Income	Physician visits per person per year White	 Non-white
Under $2,000	4.9	2.9
$2,000-$3,999	4.6	3.4
$4,000-$6,999	4.6	3.5
$7,000-$9,999	4.7	3.5
$10,000 and over	5.1	4.3
All Incomes	4.7	3.3

Source: [12, p. 35].

Another means of examining the impact of incomes on the health status of persons is to analyze the restricted activity of people. Restricted activity days are the number of days persons have missed work or school or otherwise reduced their usual activities. Persons with a family income of less than $2,000 per year are likely to have about 30 restricted activity days per year. On the other hand, persons with over $7,000 family income have only about 12 restricted activity days, less than half the amount of low-income people. These comparisons are shown in Figure 2.

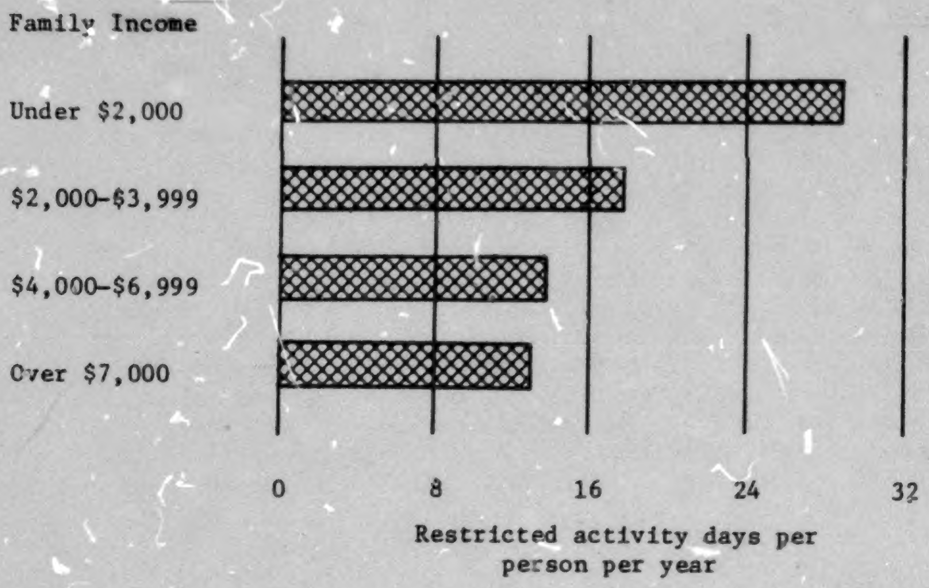

Figure 2. Impact of illness on activity of persons, by income level.

Source: [13].

A national health survey in 1966 resulted in the following generalizations about the incidence of chronic disability among various social groups:

1. More than twice as many men as women were unable to carry on a major activity. The disadvantage of men was especially pronounced among those aged 45 and over--the ratio was 4 to 1.

2. Non-white persons (2.7 percent) reported 30 percent more total limitation of activity than white persons (2.2 percent).

3. Persons residing in Standard Metropolitan Statistical Areas reported considerably less inability to carry on a major activity (1.8 percent) than those residing in other areas--non-farm (2.7 percent) or farm (2.3 percent).

4. The percentage of persons who reported total limitation of activity was more than four times as great among those aged 45-64 as among those aged 17-44, and persons aged 65 and over were almost five times as likely to suffer total limitation as those 45-64.

5. More than 15 percent of persons 17 years of age and over who had less than five years of schooling were unable to carry on a major activity (15.6 percent). The percentage with a major activity limitation dropped to 5.8 percent when they had five to eight years of schooling and down to 1.7 percent for those with nine to eleven years

of schooling. Total disability among persons with 12 years or more of schooling declined still further to about 1 percent [7].

Rural areas seem to have less medical care than do metropolitan counterparts based on one measurement, the ratio of physicians per 100,000 population. As shown in Table 3, there are nearly four times as many physicians per 100,000 population in greater metropolitan areas than in isolated rural areas (173 physicians per 100,000 in metro areas compared to 46 physicians per 100,000 in rural areas). This does not mean that the people in isolated areas are completely without care, but it does have two important implications. One, rural people may have to travel longer distances to find medical care. Two, if there are relatively few physicians in an area, it may be difficult to see doctors who may already have more patients than they can handle.

Table 3. Nonfederal physicians (M.D.) per 100,000 population, by county group, 1963.

County group	Total active	Active in Private Practice[a]		
		Total	General practice	Full-time specialty
United States	125	91	35	56
Metropolitan-adjacent	136	98	35	63
Greater metropolitan	173	118	38	80
Lesser metropolitan	125	92	30	62
Adjacent to metropolitan	75	65	38	27
Isolated	75	65	38	27
Isolated semirural	81	69	38	38
Isolated rural	46	44	38	6

[a] Difference between "total active" and "total active in private practice" is accounted for by "hospital staff, interns, residents, teaching, research, industry".

Source: [12, p. 75].

FACILITIES CONSTRUCTION

The Hospital Survey and Construction Act, commonly known as the Hill-Burton Act, is one of the earliest and probably the most influential pieces of federal health legislation. It provides grants for facilities construction--hospitals, outpatient facilities, public health centers, rehabilitation centers, nursing homes, chronic-disease hospitals, and state health laboratories--which are very important in determining the geographic and functional pattern of health care delivery [10]. First enacted in 1944, it originally was intended to assist states in making surveys on their health facilities, determining their expected facility needs, and developing comprehensive plans to meet those needs; but it has gradually been expanded to cover the functions listed above.

Originally, the Hill-Burton Act was aimed principally, but not exclusively, at rural areas, where there was a chronic facilities shortage. In 1964, the emphasis was shifted from construction of new facilities in rural areas to the renovation of aging hospitals in metropolitan areas.

From 1947 to 1969, the program supported 7,400 projects which increased total hospital capacity by 300,000 beds. The federal funds amounted to $2.2 billion of the total $7 billion project cost [11, p. 840].

In fiscal year 1970, ten Hill-Burton projects were approved in Oklahoma. They provided 256 inpatient care beds and three other health care facilities. The total cost of these projects was over $14.4 million with the Hill-Burton grant portions totaling over $3 million [23].

While the construction of new facilities is the most obvious contribution of the Hill-Burton program, it also introduced comprehensive state planning, formulation of uniform hospital construction standards, more efficient hospital operation, better health care in rural areas, and support of medical education through better facilities at teaching hospitals. Intergovernmental relations were aided through Hill-Burton, because communities joined together to build facilities; and community health planning backed by the federal government was initiated.

One of the criticisms of the program is the funding formulas. Because the federal government only paid up to two-thirds of the cost, communities that were extremely poor, and unable to raise their portion, were not given priority. In recent years, that has changed with the provision that poverty areas receive up to 90 percent of the cost in federal funding. Some critics feel that the shift in priority from rural to urban areas was too late in coming, after obsolescence and rising costs had overtaken many metropolitan hospitals. Other critics feel that the comprehensive planning was not fully implemented which continued to perpetuate duplication and inefficiency [11, p. 845].

In general, it seems that the Hill-Burton program was successful in increasing the number of facilities available and in breaking ground for comprehensive planning and cooperation among the many agencies and governments dealing with health.

REGIONAL MEDICAL PROGRAM

The Regional Medical Program originated in 1965 as a special attack on the problems of heart disease, cancer and stroke [24]. It has since been expanded to include kidney and other diseases.

This program came as the result of recommendations from the Commission on Heart Disease, Cancer and Stroke (1964), which suggested the establishment of a national network of regional medical complexes [15]. At the center would be specialized hospital and research faculty connected with regional diagnostic and treatment stations. The proposal was opposed by the American Medical Association (AMA) and the American Academy of General Practice (AAGP). The AMA argued that medical schools provided the centers for such complexes in reality and the AAGP maintained that it was an unwarranted implication of the inadequacy of general practitioners, and that what was needed was more GP's [11, p. 847].

Instead of a tightly knit complex, what has evolved is a loosely structured federation called regional medical programs. There are now 55 organized regions within the 50 states and territories.

The Oklahoma program, organized in 1966, is located at the University of Oklahoma Medical Center in Oklahoma City. It has an advisory council made up of administrators, health professionals, and civic leaders to design programs. Nine major projects are in operation throughout the state of Oklahoma as area or statewide programs aimed at continuing education for professionals, screening for early diagnosis, or intensive care for patients [15, 16].

The Regional Medical Program is not without criticism, even in its present form. One such criticism is that by being oriented toward specific diseases and funded by categorial grants, it is the antithesis of a comprehensive program. This has a narrowing impact by limiting attention to the disease and preventing a broader look at factors surrounding it. Most obviously, it is provider, rather than consumer oriented. Local advisory councils, heavily controlled by professional medical interests, have veto power over projects and tend to repress changes in the system. The regional essence of the program has also experienced political repercussions. The regions are defined on the basis of medical areas rather than on political jurisdictions. While this is logical from a problem-solving standpoint, it is viewed as a threat by some who want money distributed through existing political channels. The program's grants go directly from the federal government to the regions, bypassing state and local governments [11, p. 850].

COMPREHENSIVE HEALTH PLANNING

The most far-reaching health planning effort ever undertaken in the United States is the comprehensive Health Planning Program. It involves state and local planning of comprehensive health services on the broadest possible basis.

The federal legislation creating this nationwide program is the Comprehensive Health Planning Act, sometimes called the Partnership for Health Act, which was enacted in 1966 as Public Law 89-749. In articulating the purposes to be served by this act, Congress has formulated the following statement which serves as a national health objective:

> The Congress declares the fulfillment of our national purpose depends on promoting and assuring the highest level of health attainable for every person, in an environment which contributes positively to healthful individual and family living; that attainment of this goal depends on an effective partnership, involving close intergovernmental collaboration, official voluntary efforts, and participation of individuals and organizations; that federal financial assistance must be directed to support the marshalling of all health resources--national, state, and local--to assure comprehensive health services of high quality for every person, but without interference with existing patterns of private professional practice of medicine, dentistry, and related healing arts [25].

Federal funds through this legislation are available for the following activities:

A. Grants to states for comprehensive state health planning. As of March, 1971, 56 state-level "A" agencies had been created in states and territories. These agencies have a health planning advisory council staff of professional planners who work with the existing state agencies to coordinate their health planning. A majority of members of this advisory council must represent the consumers of health services. The state agencies do not take over the work of Hill-Burton or Regional Medical Program planners, but attempt to coordinate these and other official and voluntary health programs. In Oklahoma, the State Health Planning Agency, in the Office of Community Affairs and Planning, was created to do state level planning and coordination.

B. Comprehensive regional, metropolitan area, or other local area planning for coordination of existing and planned health services. Local level, or "B" agencies as they are popularly known, had been funded or approved for funding in 127 areas by March, 1971. These agencies may receive federal funding up to 75 percent of the costs of developing and revising comprehensive regional, metropolitan area, or other local area plans for coordination of existing and planned health services, including the facilities and persons required for providing the services.

In Oklahoma, most of these areas correspond to already existing boundaries of Economic Development Districts. Planning is already underway in seven areas, covering roughly the eastern half of the state, and new planning organizations are being discussed in several communities in western Oklahoma.

C. Training, study, or demonstration grants for the development of improved or more effective comprehensive health planning. About 25 "C" projects have been funded nationally. In Oklahoma, the Department of Health Administration, College of Health, University of Oklahoma Health Sciences Center is funded for two kinds of "C" activities. One is a Masters degree program in comprehensive health planning, and the other is a series of week-long seminars for local health planners, administrators, and other interested persons.

D. Grants to state health and mental health authorities to assist in maintaining health services. Federal grants are made to the state health and mental health departments for establishing and maintaining adequate public health services, including training of personnel for state and local work. A prerequisite to state grants is the development of a state health plan. At least 15 percent of the state grant goes for mental health. The federal contribution equals one-third to two-thirds of the state budget, depending on income and population criteria.

E. Grants for special projects. Special projects of (1) geographic significance; (2) new health service program support; or (3) studies, demonstrations or training involving new or improved health service methods are being carried out around the country.

Several unique and significant aspects of this comprehensive planning program should be reviewed. First, it places emphasis on all aspects of health, including preventive measures, environmental measures, early detection of disease, and prompt and effective treatment and rehabilitation. Second, a planning mechanism is created which will be a continual reevaluation of the status of community health and programs.

A third unique aspect of this program is that it, for the first time, gives non-professionals, sometimes called health consumers, a policy voice in determining public health policy. It should be made clear that these non-professionals do not participate in the diagnosis and treatment of diseases, the tasks medical professionals are trained to do. But it will make health consumers participants in selecting sites and financing of health facilities, inventorying community health needs, identifying priorities for community investment in health programs, and helping the community qualify for special state and federal health programs.

This comprehensive planning legislation is not without its limitations which include uncertainties about adequate funding for an extended period of time, lack of clear-cut guidelines for conducting planning, and the role of solo practitioners in new medical organizations [6]. It will be difficult for this planning organization, with its mandate for comprehensiveness to coordinate the work of older, entrenched agencies such as Hill-Burton and the Regional Medical Program, as well as the voluntary agencies, such as Red Cross, Heart Association, and others dealing with various aspects of health.

HEALTH PLANNING PRINCIPLES, OBJECTIVES AND CRITERIA

The health planning field, being a new one, has not yet developed a rigorous set of techniques and procedures for planning. However, certain objectives and criteria are evolving from the work of scholars and practitioners in the field. Health planning draws heavily on planning principles developed for other purposes. They recognize political, economic, and practical realities of organizing community efforts for defining and achieving objectives.

Health Planning Objectives

The Oklahoma State Health Planning Agency [17] has developed a set of objectives that good planning is expected to achieve. They are:

1. Identify health problems and needs and help to set realistic goals, keeping in mind expected changes in the area's characteristics.

2. Help to integrate health needs into physical, economic, and other planning for area development.

3. Improve organizational patterns for health services.

4. Speed development of needed new health services, strengthen existing services, and improve utilization.

5. Help to achieve better geographical distribution of health services with optimum utilization.

6. Improve the quality of health care through better coordination.

7. Eliminate duplication of health services among official and voluntary agencies at all levels.

8. Discourage programs not needed.

9. Reduce fragmentation of health services at the community level.

10. Foster better use of scarce health manpower and more effective development of training resources.

11. Establish priorities among new health programs and services, strike better balances among services, and provide services more responsive to special health needs in the area.

12. Encourage closer relationships among health services, research and training.

13. Spur faster application of new health knowledge.

Health Care Criteria

Specifying operational criteria for evaluating our health services delivery system has been an elusive task. The best criteria deal with hard, quantified data, which have been in short supply. With expanded emphasis on community-wide health planning, it will be more and more important to improve these criteria which will help communities make decisions. The National Health Council, Inc. [14, p. 24] developed the following criteria for judging the adequacy and potential of organizational systems for providing health care services:

1. Availability of Comprehensive Services.

   The full range of services, medication, facilities and equipment for maintaining or regaining maximum physical and mental health exists.

2. Accessibility.

   The number (i.e., quantity) of the services and facilities, where they are located, the hours of service, and eligibility requirements, including payment, do not create barriers for provision or use.

3. Continuity.

   Services and facilities are coordinated so that there is no break in care and the result is accessibility of the needed services at the proper time.

4, Acceptability.

Services and facilities meet professional standards, are agreeable to and used by the provider and consumer population for whom they are intended.

5. Efficiency.

Maximum returns from the investment of manpower and funds.

6. Responsiveness.

Adjustability to changes in knowledge and technology and human needs.

MEDICAL MANPOWER PROGRAMS

One of the solutions to the medical crises is to increase the amount of medical manpower available to serve the public. The most obvious approach has been to increase, somewhat, the number of medical schools and the size of classes at existing medical schools. The most innovative changes come, perhaps, in the field of paramedical or allied health personnel.

The most well-known program is called MEDEX, at the University of Washington, where former military medical corpsmen are given refresher courses in civilian medical procedures. These medics then become assistants to practicing physicians. Other types of paramedical persons such as nurse practitioners are being trained to assist and relieve physicians of some of their daily duties. These personnel are being considered an important way of increasing the number of medical personnel, particularly in doctor-shortage places such as rural communities. The aim is to develop a profession of people, not as highly skilled as doctors, who can operate independently, but with substantial contact with the doctors. They will relieve physicians of health screening, and other routine responsibilities and thus increase productivity of the practicing professionals.

Oklahoma Manpower Status

Oklahoma manpower evaluations indicate that the distribution of medical personnel within the state follows the same pattern as the national trend--more physicians locate in urban than rural areas. Oklahoma County and Tulsa County with one physician for each 596 and 599 residents, respectively, are in advantageous positions. Roger Mills County is in the worst situation with one physician for 4,452 people. The state-wide average is one physician for each 985 persons. These data can be compared with national ratios by looking at the ratio of physicians per 100,000 population. The United States total, for 1963, was 125 physicians per 100,000 population, as discussed in Table 3 above. Only four counties (Ellis, Oklahoma, Tulsa, and Washington Counties) equal or surpass that ratio. Oklahoma County has the highest ratio of 168.1 physicians per 100,000 population, which is considerably higher than the national ratio. The actual physician to population rate and the ratios on the basis of physicians per 100,000 population are shown in Table 4 for each county in the state of Oklahoma.

Manpower availability for other health occupations is also important. The pattern that exists is generally true for other specialties, also, with the largest concentrations being in the two major urban areas.

Projected Manpower Needs

Projections of manpower needs in several health career fields for Oklahoma have been made and reported by the State Health Planning Agency. The greatest needs are for additional registered nurses, licensed practical nurses, and nurse aids [19, pp. 77-78]. The Oklahoma Employment Securities Commission reported 57,400 wage and salary workers employed in medical and health service facilities in 1967 and projected this figure will reach about 78,000 by 1975.

New programs to meet these manpower needs are underway at a number of colleges and universities in the state. Dr. Vivian Smith of the Oklahoma Regional Medical Program has identified training programs underway at 62 colleges, universities, and vocational-technical schools and at 71 hospitals [26, 27]. These programs range from M. D. training to occupational therapy and practical nursing.

Several strategies for increasing health manpower in community health have been identified by the Health Resources Information Center. These strategies include:

A. Increments in the Manpower Pool and Health Labor Force

    1. Health Careers information and education for the uncommitted.

    2. Increased educational opportunities through support of institutions:
        a. Program
        b. Buildings
        c. Scholarships for students.

    3. Reactivation of professional "drop-outs".

Table 4. Physicians in active practice, physician to population rate, and physician per 100,000 population ratio, by county, Oklahoma, September 1971.

	Number of physicians[1]	Physician to population rate	Physician per 100,000 population ratio
Adair	6	2,523	39.7
Alfalfa	3	2,408	41.4
Atoka	6	1,829	54.6
Beaver	5	1,256	79.5
Beckham	15	1,050	95.2
Blaine	7	1,685	59.2
Bryan	9	2,839	35.2
Caddo	11	2,630	38.0
Canadian	17	1,897	52.7
Carter	45	830	120.4
Cherokee	4	5,794	17.2
Choctaw	5	3,028	33.0
Cimarron	2	2,073	48.2
Cleveland	59	1,387	72.0
Coal	2	2,763	36.1
Comanche	4	2,704	37.8
Cotton	4	1,708	58.4
Craig	8	1,840	54.2
Creek	28	1,626	61.4
Custer	18	1,259	79.4
Delaware	5	3,553	28.1
Dewey	2	2,828	35.3
Ellis	7	733	136.4
Garfield	65	867	115.3
Garvin	13	1,913	52.2
Grady	25	1,174	85.1
Grant	3	2,372	42.1
Greer	6	1,330	75.1
Harmon	2	2,568	38.9
Harper	3	1,818	58.2
Haskell	5	1,916	52.1
Hughes	11	1,203	83.0
Jackson	12	2,575	38.7
Jefferson	6	1,188	84.1
Johnston	2	3,935	25.4
Kay	47	1,038	96.2
Kingfisher	10	1,286	77.7
Kiowa	8	1,567	63.8
Latimer	5	1,720	98.6
LeFlore	16	2,009	49.7
Lincoln	10	1,948	51.2
Logan	12	1,637	60.9
Love	4	1,407	70.9
McClain	7	2,022	49.3

Table 4. (Continued)

	Number of physicians[1]	Physician to population rate	Physician per 100,000 population ratio
McCurtain	13	2,203	45.3
McIntosh	9	1,386	72.0
Major	2	3,765	26.4
Marshall	5	1,536	65.2
Mayes	14	1,664	60.0
Murray	6	1,778	56.1
Muskogee	55	1,083	92.3
Noble	5	2,009	49.7
Nowata	5	1,955	51.0
Okfuskee	6	1,781	56.1
Oklahoma	886	596	168.1
Okmulgee	26	1,360	73.5
Osage	10	2,975	33.5
Ottawa	19	1,568	63.7
Pawnee	9	1,260	79.2
Payne	33	1,534	65.0
Pittsburg	23	1,631	61.2
Pontotoc	33	844	118.3
Pottawatomie	33	1,307	76.4
Pushmataha	4	2,346	42.6
Roger Mills	1	4,452	22.4
Rogers	12	2,369	42.2
Seminole	11	2,286	43.6
Sequoyah	7	3,339	29.9
Stephens	24	1,496	66.8
Texas	8	2,044	48.3
Tillman	7	1,843	54.2
Tulsa	668	599	166.6
Wagoner	7	3,166	31.5
Washington	55	787	129.9
Washita	6	2,024	49.4
Woods	6	1,987	50.2
Woodward	10	1,554	64.3
Oklahoma	2,599	985	101.5
United States	NA	NA	125.0[2]

[1] Includes both Doctors of Medicine and Doctors of Osteopathy.

[2] U.S. data are for 1963.

Source: [21]

4. Conversion of military health specialists to civilian counterparts.

5. Intensive recruitment into health agencies, institutions, etc.
    a. From new careerists.
    b. From other health enterprises.
    c. From non-health sector.

B. Increments in Productivity and Effectiveness of Existing Work Force.

1. Realignment and redistribution of job tasks within current organizational goals, structure, etc.

2. Creation of new categories of personnel (aids, assistants, etc.).

3. Staff development through in-service education, leave, etc.

4. Automation and labor saving machines and methods.

5. Administrative innovations for personnel deployment.

6. Re-evaluation of agency goals, objectives, methods, and re-allocation of manpower [18, p. 74].

MEDICAL ORGANIZATIONS

The majority of medical care in the United States can be described as fee-for-service, solo practice. An individual physician practices alone and receives fees, paid either by the individual or a third-party carrier, on a visit-by-visit basis.

Current research and planning seems to be envisioning a change in this situation. There is a movement to encourage physicians to enter into group practice arrangements. That is, two or more doctors work together under a pre-arranged income distribution agreement. This type of practice is thought to encourage several physicians with different specialties to work in close proximity which would simulate one-door treatment normally associated with general practitioners. This organizational arrangement tends to cope with the increasing tendency for physicians to become more specialized rather than go into general practice. It may also be more economical in terms of capital investment and utilization of allied health manpower.

Another organizational modification results from the use of allied health personnel in outlying communities. One such example is a demonstration project being conducted by the New Mexico Health and Social Services Department working with the National Aeronautics and Space Administration. This project combines some of the sensor technology developed for monitoring astronauts with allied health personnel. A technician staff in a mobile unit or a remote area health center can hook up these electronic sensors to individuals being tested. The signals transmit the life signs to a central physician-monitored computer who relays his diagnosis and prescription to the field technician by radio or television.

Still another organizational modification results from rotation of physicians and related health personnel from central medical facilities to more remote areas. In Wakita, Oklahoma, staff of a community health center in a group-practice, fee-for-service arrangement also serve as teaching staff of the University of Oklahoma Medical Center. Students and residents in family practice and preventive medicine from the Medical Center serve there on a rotating basis.

Similar examples of pilot projects exist in a number of areas throughout the country. A summary of some of them and their locations are shown in Table 5.

The current administration proposal for a national health insurance included a provision for Health Maintenance Organizations (HMO). They have been defined by the Department of Health, Education and Welfare as:

> .....any organization which is an organized system of health care and which provides an agreed upon set of comprehensive health maintenance and treatment services for an enrolled group of persons through a prepaid aggregate fixed sum or capitation arrangement [20].

HMO's are still an unknown quantity which are generating a good deal of discussion in the health field. Several of the other current proposals for national health insurance contain references to group practices and pre-paid insurance which would foster organizations similar to the HMO concept.

Similar organization-financing systems already exist in several parts of the United States. The Kaiser-Permanente plan on the West Coast, United States is perhaps the most well-known. One popular misconception about these plans is that patients do not have a choice of physicians, but this is not the case. There are a number of physicians practicing within the group organization, and the patient has a choice of physicians within that group. Members pay a fixed monthly fee to the group rather than pay on a fee-for-service basis. The objective of this arrangement is to foster preventive health care, which may reduce acute cases requiring hospitalization. It has been

Table 5. Summary of demonstration models of health care delivery, United States, 1970.

Plan	Sponsor	Location	Description
Solo Practice	Individual physician.	Nationwide rural and urban areas.	Individual physician carries on medical care for his patients.
Community Health Program	University of Florida College of Medicine with community advisory committee.	Lafayette County, Mayo, Florida.	Medical and nursing students with resident deliver health services under supervision of College of Medicine.
Oklahoma's Project Responsibility	University of Oklahoma Medical Center with state medical association and citizens of Wakita.	Wakita, Oklahoma	State-wide program with pilot project in rural Wakita.
Pilot Project in Rural Medical Care	University of New Mexico School of Medicine, RMP, Sears, and local community.	Estancia, New Mexico.	Nurse practitioner specially trained delivers services under direct supervision of School of Medicine.
Lawarence County Alabama Plan	Tri-County Regional Health Planning Commission in Alabama.	Moulton, Alabama.	Delivery of comprehensive health care services through health team approach.
Demonstration in Organization of Community Health Resources	Pennsylvania Department of Health and Public Health Service with local community advisory committee.	Five county area in rural central Pennsylvania	Develop community organization, involve local groups, and test health care delivery system.
Rural Health Project	Monterey County Medical Society, Southern Monterey County Medical Group and OEO Grant.	King City, California	Provides comprehensive medical care to all residents including migrant farm workers.
Crossroad Medical Center	State medical society's Committee on Rural Medical Service and local citizens.	Upstate rural counties in New York.	Plans to establish medical centers in service areas with appropriate MD staff.
Maine Coast Regional Health Facilities Plan	Physicians and community citizens.	Downeast area of coastal Maine.	Comprehensive medical care program with central hospital and outlying satellite clinics.

Table 5. (Continued)

Plan	Sponsor	Location	Description
Physician-Monitored Remote Area Health Program	New Mexico Health and Social Services Department, NASA Manned Spacecraft Center and local citizens.	Southeast corner of New Mexico.	Remote health centers equipped with NASA sensors and other devices in direct contact with MD at control centers.
Iowa State-wide Plan	Iowa Medical Society in cooperation with College of Medicine and State Health Planning Council	State-wide planning.	Considering delivery and accessibility of plan for all of Iowa.

reported that when the Kaiser doctors increased ambulatory care 25 percent, the result was a 50 percent decrease in hospitilization [19, p. 6].

NATIONAL FINANCING PROPOSALS

Several national health insurance proposals are currently being considered in Congress as ways of eliminating the private financial burden of paying for soaring medical costs. The principal plans receiving the most attention are:

A. Health Security Act (Kennedy Plan);

B. National Health Insurance and Health Services Improvement Act (Javits Plan);

C. Health Insurance Assistance Act (A.M.A. "Medicredit"); and

D. National Health Insurance Standards Act and Family Health Insurance Plan (Nixon Plan) [2].

Kennedy Plan

The National Security Act, Kennedy bill, contains the most comprehensive benefits in terms of health services and population served. Some of the benefits covered include fees of physicians, optometrists (including eyeglasses), podiatrists, and some dentists; unlimited hospital care; 120 days of extended care facility care per spell of illness; prescribed appliances; home health care; laboratory services and x-rays; mental health care (except custodial care); and prescribed drugs. Eventually the entire population would be included although initially dental care would be provided only for children up to 15 years old.

Financing would be provided through general and social security taxes. Fifty percent of financing would be from federal funds; 36 percent from employers; 12 percent from employees and two percent from self-employed. Funds would be allocated first to physicians in group practice and similar programs, with the remainder going to solo practitioners on a fee-for-service or per-case basis. Fee schedules would be established for fee-for-service practices. Financial incentives to physicians in group practice would exist when they can demonstrate cost savings.

Physicians applying for licensure after the plan goes into effect would be required to meet national standards, in addition to state standards. Efforts would be made to help reduce manpower shortages in some areas.

Administration of the program would be by a five-member Health Security Board reporting to the Secretary of Health, Education, and Welfare. They would supervise a network of regional, sub-regional, and local Health Security offices to determine priorities, provider payments, and facilities. Consumers would be represented on a Health Security Advisory Council.

Javits Plan

The National Health Insurance and Health Services Improvement Act introduced by Senator Javits allows for either a participation in national health insurance or use of private insurance. National insurance would be the same hospital, physician, extended care and similar benefits as Medicare, subject to cost-sharing and some other limitations. In addition annual check-ups, ambulatory and rehabilitative care, limited drug purchase, and dental care for children under eight would be included. The total population would be covered. Participation in some form of medical insurance would be compulsory, but employers could elect to provide coverage through private insurors as long as such coverage meets the government standards.

Medical care would be dispensed by private physicians with group practices encouraged. County medical societies would have review responsibilities for quality of medical care.

Financing would be through payroll taxes with the employer, employee, and government each paying equal shares. The poor would be covered by federal, state, and local contributions. Those with approved private insurance would not pay these payroll taxes.

Administration of the program would be by the Department of Health, Education, and Welfare, or by the state governments under contract with HEW. States would continue to monitor private insurance companies.

A.M.A. "Medicredit"

This Health Insurance Assistance Act proposal contains the least amount of changes from the current situation. Medicare would remain intact for the aged, but Medicredit would replace Medicaid for all under 65 years old. The Medicaid program currently provides financial assistance from federal and state governments for low income people. The Medicredit proposal would have the poor now under Medicaid purchase private health insurance with certificates financed through general treasury funds. Income tax credits would be provided to all for purchase of private health insurance, on a graduated basis from 100 percent for persons with an income tax liability of $400 to down to 10 percent for persons with a liability of over $1,300.

The private policies must provide 60 days of in-patient hospital service and a full range of out-patient and physician services in the hospital, home, or office. Two days of extended care facility services would be substituted for one day of hospital care. Some catastrophic coverage would be included. Everyone in the country would be eligible to participate on a voluntary basis.

No substantial changes in the health care delivery system are suggested in the proposal. Quality care would be reviewed by peers through the county medical societies. The bill does not address the issue of rising costs beyond urging stronger utilization review by peers. State insurance departments would continue to approve premium rates for private insurance companies.

Nixon Plan

The National Health Insurance Standards Act (for employers) and the Family Health Insurance Plan (for the poor) have been proposed by the Nixon administration. The private phase, financed by employers and employees, would cover all workers except state and local government employees, self-employed, domestic, part-time and seasonal workers. The public phase, for the poor, would provide free insurance to families of four with incomes of less than $3,000 per year. There would be a graduated schedule of charges for those earning up to $5,000.

Benefits include hospital and physician services in and out of the hospital (including extended care facilities and home care); full maternity care; baby care, including immunizations; vision care for children; outpatient laboratory services; certain other expenses; and catastrophic benefits of $50,000 per person per year.

The public phase would be financed by an increase in social security taxes. Medicaid would be replaced (except for aged, blind and disabled) with government paying up to $800 per year for premiums of Medicaid recipients. The private phase would be financed by employer contributions (75 percent after first 2 1/2 years) and employee contributions (25 percent). Employers purchase insurance from private insurance companies. Private insurance pools would be established for risk-sharing among small employers, self-employed, and people outside the labor force.

The most unique provision of this proposal is the creation of Health Maintenance Organizations, which is already underway on a trial basis. These organizations would encourage group practice by doctors, particularly the provision of a complete range of medical services. The organizations would stress preventive care.

Some cost and provider standards would be included. A new federal agency is proposed to replace state insurance departments in regulation of insurance industry.

Comparison of Health Insurance Proposals

Some form of national health insurance will likely be adopted within the next few years. The existence and success of Medicare and Medicaid have demonstrated that public health insurance is feasible. The financial burden has been considerably relieved from the aged and some of the extremely poor, but there is still a heavy cost load for people with moderately low incomes, but not poverty-stricken, particularly self-employed.

In addition to the cost-sharing advantages of a broad-based insurance program, there is a shift in the concept of health maintenance and delivery of health services. Several of the new programs, most notably the Kennedy, Javits, and Nixon plans, are oriented toward the idea of preventive medicine instead of the traditional restorative medicine. The goal is to keep people well, rather than waiting until they get sick and then applying cures and remedies. If people have more readily available care, and a less direct financial burden, consciousness and use of preventive measures will help keep them out of acute states. Changes in the delivery of health care are inclined toward group practice by physicians with several varieties of skills in a single, accessible location. The philosophy is that medical services can be dispensed more cheaply in such an organization, thus reducing the cost per patient, and simultaneously availing the patient of a broader scope of health services.

Essentially, the Kennedy, Javits and Nixon proposals, are variations of pre-paid insurance for services to be delivered mainly by physicians organized into a group practice. Persons who would be included in the plan could seek medical care from the physician of his choice, or appropriate specialty, within the group. The patient would not pay any fees, unless services were medically required which are not covered under the insurance plan. The advantages lie in the incentives to maintain high health levels for individual members and in the ability to deliver services efficiently. The Kaiser Foundation Medical Care Program in California, largest of the pre-paid plans, has done this successfully for years. Research has shown that total expenses per capita under the Kaiser program are 59 percent of those of other California physicians [1].

None of these proposals would completely eliminate the solo practitioner operating on a fee-for-service basis, who could continue to operate, much as they do in Great Britain. The real advantage lies in the fact that members of the insurance plan would have a choice among systems, as well as among physicians within the system, contrary to the present day set-up where sick people seeking care only have a choice among physicians.

The American Medical Association proposal, of the four summarized above, makes the least amount of changes in structure of the current health care delivery system. It would not give consumers a choice among systems because physicians would contribute to practice on a fee-for-service basis. Its main thrust is to bring more Americans under commercial insurance programs by granting larger income tax credits for health insurance premiums.

The Kennedy plan is the most comprehensive of all, including the greatest number of services, for the greatest population. Even so, it is estimated by supporters to cover, on the average, only 70 percent of personal health expenditures [3]. All services would be covered except: dental services for adults; nursing home benefits beyond 120 days per spell of illness; drugs not on an authorized list; and custodial care for mental patients. The Javits plan, next most comprehensive, will cover only 45 percent of health care costs. The A.M.A. plan will cover only 30 to 40 percent of health care costs. No estimates for the Nixon plan were available.

The rising costs of medical care would be addressed directly in each of the proposals, except the A.M.A. proposal. The Kennedy, Javits, and Nixon plans each contain specific provisions on this point. The Kennedy and Javits plans have incentives for cost saving by doctors; all three are aimed at efficiencies to be gained through group practices such as the Nixon Health Maintenance Organizations. All three provide for utilization committees to review the work of peers, which is an attempt to monitor quality as well as have an effect on cost by pressuring doctors to not perform unnecessary surgery or similar actions. The A.M.A. proposal relies solely on utilization committees made up of peers as a source of control.

Each of the plans reviewed is oriented principally toward personal health care delivery. None of them deals with problems of long range health planning, multiphasic screening facilities, comprehensive transportation systems, centralized data bank and retrieval systems, or certain types of laboratory services [4].

TRENDS IN HEALTH PLANNING AND COMMUNITY DEVELOPMENT

Several trends in the health sectors that have implications for rural development in Oklahoma can be projected. They are:

1. President Nixon has emphasized that the 1970's will be the decade of health. Implications that can be drawn from this are:
    a. More public money will be allocated to the health sector.
    b. More public programs will be designed, and old ones expanded.

   c. Consumer demands for health services will be increased, particularly by people who have traditionally been outside the health care clientele.

2. National health insurance will be enacted. This will cover a larger portion of the population than is now covered by commercial health insurance. It will also cover more health services.

3. The solo, fee-for-service practitioner will become rarer.

4. Complex medical organizations will come into being. The exact pattern is not clear, but it will be some form of a HMO, which is basically a group practice.

5. Emphasis will be shifted from restorative to preventive medicine. This will include increased attention to environmental impacts on health, nutrition consciousness, and health education for children and adults.

6. There will be a shift from hospital care to ambulatory care. The Hill-Burton program and Medicare have been responsible for increased demand for hospital rooms. Since these costs are rising prohibitively, attention and construction grants may shift to ambulatory clinics. Organizational ties will be developed between outlying clinics and small hospitals and more sophisticated, specialized, central hospitals.

7. The number of para-medical personnel will be increased in order to fill the gap between growing demand for health services and a slower increasing supply of doctors. These personnel will staff satellite clinics and will perform routine medical functions, now normally performed, unnecessarily, by physicians.

8. There will be less emphasis on hospital construction, particularly in rural areas. Nursing homes will continue to assume a proportionally larger responsibility for care of chronically ill and aged.

9. Consumers will have an increasingly important voice in community health decisions.

10. The federal government will continue to increase its financial participation in providing health services.

LITERATURE CITED

[1] Ball, David S. and Jack W. Wilson, "Financing Health Care," *Tar Heel Economist*, Agricultural Extension Service, North Carolina State University, Raleigh, August, 1971.

[2] Blue Cross-Blue Shield, "Five Major Proposals for National Health Insurance...," April, 1971.

[3] Battistella, Roger M., "National Health Insurance: An Examination of Leading Proposals in the Light of Contemporary Policy Issues," *Inquiry*, Vol. VIII, No. 2, June, 1971, p. 20ff.

[4] Burns, Eveline M., "A Critical Review of Health Insurance Proposals," *HSMHA Health Reports*, Vol. 86, No. 2, February, 1971.

[5] Cameron, Charles M., Jr., M.D., "Complex Health Care Demands Planning," School of Health, University of Oklahoma Medical Center, Oklahoma City, June, 1969.

[6] Cameron, Charles M., Jr., Lecture, Comprehensive Health Planning Seminar, School of Health, University of Oklahoma Medical Center, Oklahoma City, March 21-26, 1971.

[7] Conley, Ronald W., "Labor Force Loss Due to Disability," *Public Health Reports*, Vol. 84, No. 4, April, 1969, pp. 291-318.

[8] Cooper, Barbara S., *The Who, What, and Where of Medical Care Spending*, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C., February, 1971.

[9] Council on Rural Health, *Health Care Delivery in Rural Areas: Selected Models*, American Medical Association, Chicago, September, 1970.

[10] Department of Health, Education, and Welfare, *Hill-Burton Aid for Building and Modernizing Community Health Facilities*, Public Health Service Publication No. 403, Washington, 1970.

[11] Dickey, Walter J., James L. Kestell, and Carl W. Ross, "Comments: Comprehensive Health Planning--Federal, State, Local: Concepts and Realities," *Wisconsin Law Review*, Vol. 1970, No. 3, pp. 839-878.

[12] Fein, Rashi, *The Doctor Shortage, An Economic Diagnosis*, The Brookings Institute, Washington, D.C., 1967.

[13] Linder, Forrest E., "The Health of the American People," *Scientific American*, Vol. 214, No. 6, June, 1966.

[14] National Health Council, Inc., Alternatives for Organizing Personal Health Care Delivery, New York, February, 1970.

[15] Oklahoma Regional Medical Program, Progress Report, The University of Oklahoma Medical Center, Oklahoma City, March, 1970.

[16] Oklahoma Regional Medical Program, Trail Blazer, The University of Oklahoma Medical Center, Vol. 2, No. 1, April, 1970.

[17] Oklahoma State Health Planning Agency, Areawide Health Planning, Oklahoma City, November, 1968.

[18] Oklahoma State Health Planning Agency, Health Manpower Resources in Oklahoma (Selected Careers), Oklahoma City, 1970.

[19] Oklahoma State Health Planning Agency, Health Planning Bulletin, Oklahoma City, June, 1971.

[20] Oklahoma State Health Planning Agency, Oklahoma Health Planner, Oklahoma City, Vol. 4, No. 4, August-September, 1970.

[21] Oklahoma State Health Planning Agency, Unpublished Data, September, 1971.

[22] Olsen, Willard G., Letter, Regional Office of Comprehensive Health Planning, Department of Health, Education, and Welfare, Dallas, February 22, 1971.

[23] Public Health Service, Hill-Burton Project Register, Department of Health, Education, and Welfare, Washington, D.C., 1970.

[24] Public Law 89-239; 79 Stat. 926.

[25] Public Law 89-749; 80 Stat. 1180.

[26] Smith, Vivian S., Health and Health Related Programs in Oklahoma Colleges, Universities and Vocational-Technical Schools, Oklahoma Regional Medical Program, Oklahoma City.

[27] Smith, Vivian S., Health Manpower Education Programs in Oklahoma Hospitals, Oklahoma Regional Medical Program, Oklahoma City, May, 1971.

ENVIRONMENTAL AND ECONOMIC ASPECTS OF SOLID WASTE DISPOSAL

Daniel D. Badger*

INTRODUCTION

Until recently, disposal of solid wastes posed no critical problem for most cities, towns, or agricultural producers. Although the economic aspects or costs of handling the wastes have been a "griping point" for both private citizens and local government officials, no one became very uptight about how the solid wastes were being disposed. For some municipal governments, finding a place to bury, burn, or otherwise dispose of solid wastes has caused some soul-searching.

However, the good old days of considering only the quantity aspects of solid wastes disposal are gone. Private citizen complaints of smells and odors from nearby dumps and even from some sanitary landfills have led to public indignation, outcries, and a package of federal and state legislation affecting solid waste disposal. Quality--a good quality environment--is the keynote for local governments now in considering how they must handle solid wastes. Every method of solid waste disposal pollutes the air, land, and/or water. The key is to select that method which has the greatest net social and economic benefits.

What are the reasons behind this new emphasis on solid waste management? You are familiar with the changing patterns, but let us review them quickly. The general problem results from a combination of: (1) too many people concentrated into small areas; (2) increasing affluence, i.e., higher incomes, so we buy more short-lived luxury, useless items, waste more and dispose of more; (3) new technology accompanied by a desire for more leisure time which results in more products, more processing of the products, more packaging of ready to eat foods and wearing items, all with more disposables, such as throw away bottles and cans; (4) too many lazy people who don't mind littering the land and sea with bottles, cans, paper products, and every conceivable form of solid waste as they go about their work and pleasure in cars and boats; and finally, (5) a renewed concern for a cleaner, more livable environment, resulting in laws and regulations relating to public nuisances, and air and water pollution. Let's look at some of these points in a little more detail.

Per capita generation of solid wastes has increased from 2.75 pounds in 1920 to about 5.5 pounds in 1971, and is projected to increase to 8 pounds by 1980. And this figure does not represent the total wastes generated each day by disposal of items such as refrigerators, cars, furniture, destruction of old buildings for urban renewal, etc. The figure does include industrial wastes, but not agricultural processing wastes. Data on amounts of solid wastes produced, collected, and the composition of the wastes on two slightly different bases, are presented in Tables 1, 2, 3, and 4.

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*Professor of Resource Economics, Department of Agricultural Economics, Oklahoma State University.

Table 1: Amount of Solid Wastes Produced [1]

Type of Waste	Million Tons per Year	Pounds per Person per Day
Household, commercial and municipal	250	7
Industrial	110	3
Agricultural	550	15
Animal	1,500	42
Mineral	1,100	31
Total	3,510	98

[1] These figures do not include agricultural animal wastes or wastes transported or disposed of by individuals.

Source: An Interim Report: 1968 National Survey of Community Solid Waste Practices, U.S. Department of Health, Education, and Welfare, Environmental Control Administration, 1968, p. 13.

Table 2: Amount of Solid Wastes Collected [1]

Type of Waste	Million Tons per Year	Pounds per Person per Day		
		Urban	Rural	Average
Household, commercial and municipal	151	4.35	3.43	4.15
Industrial	22	.65	.37	.59
Agricultural	7	.23	.02	.18
Animal	3	.11	.03	.09
Mineral	11	.38	.08	.31
Total	194	5.72	3.93	5.32

[1] These figures do not include agricultural animal wastes or wastes transported or disposed of by individuals.

Source: An Interim Report: 1968 National Survey of Community Solid Waste Practices, U.S. Department of Health, Education, and Welfare. Environmental Control Administration, 1968, p. 13.

Table 3: Composition of Typical Solid Wastes [1]

	Percent by weight
Paper & Paper Products	
Corrugated paper boxes	25.7
Newspapers	10.3
Magazine paper	7.5
Brown paper	6.2
Mail	3.0
Paper food cartons	2.3
Tissue paper	2.2
Plastic coated paper	.8
Wax paper	.8
Subtotal	58.8
Kitchen Wastes	
Vegetable food wastes	2.5
Citrus rinds and seeds	1.7
Meat scraps (cooked)	2.5
Fried fats	2.5
Subtotal	9.2
Wood & Garden Refuse	
Wood	2.5
Ripe tree leaves	2.5
Flower garden plants	1.7
Lawn grass (green)	1.7
Evergreens	1.7
Subtotal	10.1
Miscellaneous	
Plastics	.8
Rags	.8
Leather goods	.4
Rubber composition	.4
Paints and oils	.8
Vacuum cleaner catch	.8
Dirt	1.7
Metals	7.6
Class, ceramics, ash	8.6
Subtotal	21.9
Total	100.0

[1] Based on samples taken in the New York Metropolitan area.

Source: Irwin Remson, A. Alexander Fungaroli, and Alonzo W. Lawrence, "Water Movement in An Unsaturated Sanitary Landfill," Journal of the Sanitary Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 94, SA2 (April 1968).

Table 4: Composition of Refuse from an Average Municipality

Classification	Percent of Total Solid Waste by Weight	Percent of Dry Weight Non-Combustible
Rubbish	64.0	----
Paper	42.0	6.0
Wood	2.4	1.0
Grass	4.0	6.8
Brush	1.5	8.3
Greens	1.5	13.0
Leaves	5.0	8.2
Leather	0.3	10.1
Rubber	0.6	10.0
Plastics	0.7	10.2
Oils, paints	0.8	16.3
Linoleum	0.1	27.4
Rags	0.6	2.5
Street Sweepings	3.0	25.0
Dirt	1.0	72.3
Unclassified	0.5	62.5
Food Waste	12.0	----
Garbage	10.0	16.0
Fats	2.0	0.0
Non-Combustibles	24.0	----
Metals	8.0	99.0
Glass & Ceramics	6.0	99.3
Ashes	10.0	70.2

Source: American Public Works Association, Refuse Collection Practice, Public Administration Service, Chicago, Illinois, 1968, p. 39.

Health Department officials in Oklahoma speculate that the total average daily waste disposed of in some way already may be as high as 10 pounds per day. The per capita figures for your rural areas may be slightly lower than those indicated above; however, those of you working with rural communities still have a monumental problem!

THE PROBLEM

Cities and rural communities are faced with shortages of suitable disposal sites, and with inadequate collection and disposal management practices. Currently about 20 percent of communities over 25,000 population use incineration to dispose of their solid wastes. Over 75 percent use sanitary landfills, open dumping, open burning, or composting. About one-half of those cities over 25,000 using a sanitary landfill estimate they have less than six years of life left in their existing facilities.

In many of our rural communities, population may stabilize or even continue to decline in the years ahead. However, as with those communities experiencing population growth, the problem of solid waste management will be one of the top-priority decision-areas, and one that will be costly to solve. As suitable land becomes less plentiful due to speculation, and in many cases to haphazard developments, the most ideal means of disposal and/or those sites which are least-cost and most acceptable environmental-wise, may become unavailable. This is why proper, long-range planning is needed now to project waste requirement needs, and if necessary, to obtain easements on specific landfill sites 30 to 40 years in advance.

Other factors that will affect more and more the solid waste planning decisions of local communities are the new laws on water and air pollution, and other state and local health department directives or requirements on sanitation and health. Solid wastes, if not properly handled, pose both health and nuisance problems. They also are degrading to the environment if left exposed in dumps, or alongside highways. Many solid waste disposal sites are excellent breeding places for rats, insects (particularly flies and mosquitoes), and other pests. Obviously these pests pose disease hazards to humans if the site is located near populated areas.

Other nuisances which may occur due to improper solid waste disposal practices are various odors, smoke, obnoxious gases, dust; and depending on the disposal site or practice, residents may have to tolerate noise, blowing paper, heavy traffic and an unsightly appearance. All of these nuisances can be eliminated by proper disposal measures and by good site selection--away from populated areas and disguised by the surrounding landscape (in a ravine or low area, trees around the area, or properly fenced).

FEDERAL AND STATE LEGISLATION AFFECTING SOLID WASTE DISPOSAL

Solid Waste Disposal Act of 1965 (P.L. 89-272)

This act was passed by the National Congress in 1965. In essence, Title II of the Act authorized the Department of Health, Education and Welfare: "(1) to initiate and accelerate a national research and development program for new and improved methods of proper and economic solid-waste disposal; and (2) to provide technical and financial assistance to state and local governments and interstate agencies in the planning, development and conduct of solid-waste disposal programs." Solid waste disposal as used in the act means the collection, storage, treatment, utilization, processing or final disposal of solid waste.

Resources Recovery Act of 1970 (P.L. 91-512)

This act amended or deleted most of the provisions of the 1965 Act. Key amendments are that it provides for training grants in occupations involving the design, operation, and maintenance of solid waste disposal systems; and make the general provisions of the earlier act applicable to not only disposal of solid wastes, but also resource recovery. "Resource recovery means a solid waste management system which provides for collection, separation, recycling, and recovery of solid wastes, including disposal of nonrecoverable waste residues."

Section 207(a) of the act authorizes "grants to State, interstate, municipal and intermunicipal agencies, and organizations composed of public officials which are eligible for assistance under section 701(g) of the Housing Act of 1954, of not to exceed 66 2/3 percentum of the cost in the case of an application with respect to an area including only one municipality and not to exceed 75 percentum of the cost in any other case" for making surveys of solid wastes disposal practices, developing and revising solid waste disposal plans...etc. Under section 208, grants may be obtained for construction of a new or improved solid waste disposal facility, varying from 50 to 75 percent of the cost depending on the status of the state's plan for solid waste disposal. The grant under this section may not be used for land acquisition, or for operating or maintenance costs.

Establishment of Environmental Protection Agency

The Environmental Protection Agency (EPA) came into being on October 3, 1970, by Executive Order. It is charged with the mission of "fighting environmental pollution". Among the agencies placed under its control is the Bureau of Solid Waste Management which had been in the Department of Health, Education, and Welfare. This agency is beginning to exert strong authority in the area of solid waste management, through lawsuits, court injunctions, and cease and desist orders. Thus, it has enforcement powers as well as being able to use the "carrot" approach via grants and other incentives for solid waste management programs.

Other Federal Agencies Role in Solid Waste Management

Other Federal Agencies having interests in various aspects of solid waste management include the Department of Agriculture, the Department of Housing and Urban Development, and the Department of Transportation. These departments have incorporated elements of solid waste management into their programs; however, none has taken a comprehensive approach to solid waste management nor published extensive solid waste research findings.

The Atomic Energy Commission and the Geological Survey (Interior Department) have programs for the disposal of radioactive materials in solid wastes. In the USDA, the Forest Service conducts a program relating to pulp wastes and the Agricultural Research Service is concerned with agricultural wastes. The Federal Water Quality Administration (FWQA), which is also in EPA, is concerned with waterborne solid wastes. The National Aeronautics and Space Administration is involved in the solid waste aspects of space travel. The Tennessee Valley Authority is involved in the pollution aspects of fertilizer development. The National Air Pollution Control Administration (also in EPA) conducts a program in combustion studies.

The Oklahoma Solid Waste Management Act of 1970

This act creates a solid waste management advisory committee, grants certain authority to municipal and county solid waste management systems to enter into agreements, empowers the State Health Department to adopt and enforce rules and regulations relating to solid waste management, designates the State Health Department as the State agency for participation in federal programs, and, provides for injunctions and penalties for violations.

Section 2 of the act specifies the purpose as follows: "to regulate the collection and disposal of solid wastes in a manner that will (a) protect the public health and welfare; (b) prevent water pollution or air pollution; (c) prevent the spread of disease and the creation of nuisances; (d) conserve natural resources; and (e) enhance the beauty and quality of the environment".

As defined by the act, a solid waste management system includes "The entire process of storage, collection, transportation, processing, and disposal of solid wastes by any person engaging in such process as a business or by any municipality, authority, trust, county or by any combination thereof" (Sec. 3(b)).

The solid waste management advisory committee, composed of 11 members appointed by the Governor, shall meet at least three times each year. Its function is to serve in an advisory capacity to the State Department of Health in the formulation of rules and regulations.

Sections 6 and 7 of the act relate to municipal and county solid waste management systems. For example, county commissioners are authorized to levy and collect fees and charges, and to require licenses as related to solid waste management. Also, Section 12 specifies what is illegal dumping of solid wastes and Section 14 authorizes penalities, such as a jail term or fines up to $200 per day for each violation.

The Oklahoma Feed Yards Act of 1969

This act applies only to those operators feeding more than 250 head of livestock (beef cattle, swine, sheep and horses) at any one time during a licensed year (July 1-June 30). The key provisions are in Section 10: "Owners and operators who are granted a feed yards license shall: (1) provide reasonable methods for the disposal of animal excrement; (2) provide chemical and scientific control procedure for prevention and eradication of pests; (3) provide adequate drainage from feed yards premises of surface waters falling upon the area occupied by such feed yards; take such action as may be necessary to avoid pollution of any stream lake, river or creek; (4) provide adequate veterinarian services for detection, control, and elimination of livestock diseases; (5) have available for use at all necessary times mechanical means of scraping, cleaning, and grading feed yards premises; (6) provide weather resistant aprons adjacent to all permanently affixed feed bunks, water tanks, and feeding devices; (7) conduct feed yards operations in conformity with established practices in the feed yards industry as approved by regulations made and promulgated by the Board and in accordance with the standards set forth in this act. Any feed yards operated in compliance with such standards and in compliance with the regulations made and promulgated by the Board, shall be deemed to be prima facie evidence that a nuisance does not exist; provided, no feed yards shall be located or operated in violation of any zoning regulations."

The Board can suspend or revoke the license of any feed yards operator after a hearing and an administrative determination that the operator has failed to comply with the provisions of the act. Any person violating the provisions of the act or any rule or regulation of the Board shall be deemed guilty of a misdemeanor. Upon conviction, he shall be fined for each offense, an amount not to exceed $100, provided that each day that such a violation is committed or permitted to continue is considered a separate offense.

The Oklahoma Clean Air Act and Air Pollution Council

Senate Bill 27, known as the Oklahoma Clean Air Act, became effective April 18, 1967. The State Department of Health is the administrative agency for the act. The intent and purpose of the act is "to provide the means to achieve and maintain a reasonable degree of atmospheric purity necessary for the protection and enjoyment of human, plant and animal life and property in this State consistent with and limited by generally accepted social standards and requirements, desired employment and industrial development..."

Air pollution is defined as follows:

> "The presence in the outdoor atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as to be injurious to human, plant or animal life or to preperty, or which unreasonably interferes with the comfortable enjoyment of life and property, excluding, however, all conditions pertaining to employer-employee relations."

> "Air contaminants means the presence in the outdoor atmosphere of fumes, aerosol, mist, gas, smoke, vapor, particulate matter, or any combination thereof which creates a condition of air pollution."

The State Department of Health is to advise, consult, and cooperate with other agencies of the State, towns, cities, counties, industries, other states and the federal government, and with affected groups in the prevention and control of new and existing air contamination sources within the State. The Health Department also is to encourage and conduct studies and research relating to causes, effects, prevention, control and abatement of air pollution.

The Air Pollution Council was established by the act. It consists of seven members, appointed by the Governor for a term of 7 years. The Council recommends to the State Department of Health certain rules and regulations pertaining to air pollution. The Council has adopted certain regulations--and it is enforcing them--that affect solid waste management.

Prohibition of Open Burning: Regulation No. 1 was adopted on March 9, 1969 after a public hearing on October 14, 1968. The effective date of enforcement of this regulation was January 1, 1971. The agricultural industry, producers as well as processors, as well as rural communities, should begin to plan the changes needed to comply with this regulation.

The purpose of this regulation is to prevent, abate, and control air pollution resulting from air contaminants or products of combustion released in the open burning of refuse and other combustible materials. The key words in this regulation are:

> Open burning: the burning of combustible materials in such a manner that the products of combustion are emitted directly to the outside atmosphere.
>
> Combustible Materials: any substance which will readily burn, including those substances which, although generally considered incombustible, are or may be included in the mass of the material burned or to be burned.
>
> Refuse: garbage, rubbish, and all other wastes generated by a trade, business, industry, building operation, or household.

Air contaminants or products of combustion: all particulate and gaseous air contaminants emitted as a result of the burning of refuse and combustible materials.

There are provisions in the regulation relating to restrictions on salvage operations utilizing open burning. Also in Section 1.6 (Municipal Solid Waste Disposal) cities or towns of greater than 10,000 population may not utilize open burning in the operation of dumps or other solid waste disposal areas. This regulation applies to the cities and towns themselves, as well as to disposal areas operated under license, permit, or contract to a city or town.

Section 1.6 of Regulation Number 1 has been amended. The following statement was adopted in June 1971 by the State Health Department as part of its Solid Waste Management Regulations, and will be adopted by the Air Pollution Council at its August meeting. The amendment is as follows:

> "Any city adjacent thereto with a common boundary with a city or town of population of at least 10,000 population shall be deemed to fall within the provisions of this section, effective July 1, 1971. The following time schedule shall likewise apply to cities and towns of lesser population and those adjacent thereto with a common boundary:
>
> 5,000 to 10,000--July 1, 1972
> 3,000 to 5,000--July 1, 1973
> all other cities and towns--July 1, 1974

There are some operations involving open burning which are exempt from this regulation. These are of particular interest to the agricultural industry. In view of the importance attached to this exemption, Section 1.7 on Permissible Open Burning and those sub-sections pertinent to agriculture are quoted verbatim.

> "the open burning of refuse and other combustible material may be conducted as specified in the sub-sections set forth below if no public nuisance is or will be created and if the burning is not prohibited by, and is conducted in compliance with, other applicable laws and the ordinances, regulations, and orders of governmental entities having jurisdiction, including air pollution control ordinances, regulations, and orders. The authority to conduct open burning under the provisions of this section does not exempt or excuse a person from the consequences, damages, or injuries which may result from such conduct nor does it excuse or exempt any person from complying with all applicable laws, ordinances, regulations, and orders of the governmental entities having jurisdiction, even though the open burning is conducted in compliance with this section.
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> .
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1.702 Fires set for the elimination of a fire hazard which cannot be abated by any other means when authorized by the appropriate governmental entity.

1.703 Fires set for the removal of dangerous or hazardous material where there is no other practical or lawful method of disposal.

1.704 Camp fires and other fires used solely for recreational purposes, for ceremonial occasions, or for outdoor noncommercial preparation of food.

1.705 Fires purposely set to forest or range lands for a specific reason in the management of forests or game in accordance with the practices recommended by the Oklahoma Department of Wildlife Conservation, the Oklahoma State Department of Agriculture, and the United States Forest Service.

1.706 The burning of trees, brush, grass, and other vegetable matter in the clearing of land, right-of-way maintenance operations, and agricultural crop burning if the following conditions are met:

a. Prevailing winds at the time of the burning must be away from any city or town, the ambient air of which may be affected by air contaminants from the burning;
b. The location of the burning must not be adjacent to an occupied residence other than those located on the property on which the burning is conducted;
c. Care must be used to minimize the amount of dirt on the material being burned;
d. Oils, rubber, and other similar materials which produce unreasonable amounts of air contaminants may not be burned;
e. The initial burning may begin only between three hours after sunrise and three hours before sunset and additional fuel may not be intentionally added to the fire at times outside the limits stated above; and
f. The burning must be controlled so that a traffic hazard is not created as a result of the air contaminants being emitted.

Other sub-sections of the exemption relate to open burning by towns smaller than 10,000 population and to the burning of hydrocarbons, particularly those spilled as a result of pipeline breaks or other accidents involving transportation of such materials. Persons affected by those provisions should obtain a copy of the complete regulation.

Tulsa City-County has passed a clean air ordinance and an ordinance on open burning similar to this Act and Regulation No. 1. Section (g) of the latter ordinance prohibits open burning of plant life in Tulsa county. However, if agricultural producers can show that open burning of plant life is necessary and that no fire hazard will occur, they may be able to secure a permit from the Medical Director of the Tulsa City-County Health Department, after receiving approval of the appropriate fire department. Such burning shall be permitted only between the hours of 6:00 a.m. and 10:00 a.m. This ordinance became effective September 1, 1968.

It is likely that other City-County governmental units will pass similar ordinances, which will affect some agricultural interests.

STAGES IN SOLID WASTE MANAGEMENT

Economic and timely disposal of solid wastes depends on more than proper selection and location of a landfill or incineration site, excavation and compaction of the wastes, or controlled burning of the wastes and disposal of the ashes. Let's look at all the steps or stages which involve financial expenditures and planning by community leaders.

Storage

The first stage is storage. This means storage by the home owner, tenant, local business firm and factory or plant for a specified time interval, usually 3 or 4 days. Selection of method of final disposal and method of transport will have some effect on type of container used for initial storage. Most rural communities have made great strides in adopting containers that improve the sanitary aspects and handling efficiencies. For example, local ordinances recently adopted by some towns prohibit the use of 55 gallon-drums as storage containers by homes and businesses.

In some municipal solid waste management systems, short term storage is also provided at a transfer station, i.e., the solid waste is collected from initial storage points and assembled at a central point for later transport to a final site. If the landfill site or incineration plant is a long distance from the collection points, this may be feasible. Certainly if part of the solid wastes (paper, metal, glass, etc.) is separated and will be shipped via larger truck, by rail, or by barge to a recycling site, this intermediate storage makes sense, as economies in shipping likely will be obtained with larger shipments.

Most rural areas in the immediate future likely will be using a sanitary landfill located in the vicinity of the initial collection points. Thus intermediate storage may not be feasible. However, new, relatively inexpensive methods of separating the solid wastes may become available. Thus, it may be worthwhile for you to explore the feasibility of such separation of the wastes and sale of part of the wastes to recycling plants. Some communities are finding the sale of some of the waste more than pays for the costs of ownership and operation of the separation equipment. Also, as more solid waste is disposed of for recycling, less waste remains for final disposal in the local area via sanitary landfill or incineration. Your landfill site requirement or incinerator plant size may be smaller than you thought. Hence, you and your community leaders may want to seriously consider a transfer station for intermediate storage and for separation of the wastes. Obviously there are additional costs involved: handling; possible additional transportation; and construction and maintenance costs of the transfer station and related equipment.

Collection

The second stage in solid waste management is the collection. This is by far the most expensive step and may account for as much as 80 percent of the total costs of the solid waste management program. Costs of acquisition and maintenance of trucks and other equipment and costs of collection personnel have both increased by 100 percent or more in the last 15 years and will likely continue to increase at a rapid rate. The increased costs of the collection process must be projected and taken into account by community leaders.

Alternatives that should be analyzed for cost effectiveness in collecting the solid wastes are: (1) transfer of material from storage containers located at curbs or in alleys directly to the truck; (2) manual transport of the full containers from back doors to the truck for dumping and empty containers returned; (3) emptying of full containers into carrying tubs, which could be on wheels, and then emptying of these carrying tubs into the truck; (4) exchange of full containers for empty ones (and every resident complains he had a new trash container and always winds up with a rusty bent one!); (5) location of large portable containers (dumpsters such as O.S.U. uses) at strategic locations so that smaller full containers can be emptied into the larger containers, with the larger container being emptied less often; and (6) use of disposable refuse bags for curb, alley, or back door collections. There are possible variations or combinations of the above, as well as newer methods which should be considered by community leaders.

Many factors affect the method or combination of methods used. Physical shape and size of the city, density of the population, frequency of pick-up, and how much work the citizens are willing to do, (i.e., are they willing to put garbage on curb or in the alley?) are but a few.

Collection costs vary greatly, depending on the above factors, as well as on wage rates, union work rules, etc. Costs per ton for collection of refuse ranged from $9.15 to $24.96 per ton in a sample of 5 cities surveyed recently. Labor represents 60 to 80 percent of these collection costs.

Disposal--Sanitary Landfills and Incineration

Although there may be several feasible methods of disposal, in Oklahoma the two most likely to be used in the future are incineration and sanitary landfills. Since we are thinking primarily of rural area problems and solutions in the short course, I will concentrate on sanitary landfills. I believe these are the most economically feasible and technically adaptable for most of our rural communities. Composting, pyrolysis (a low oxygen, high temperature burning method), high temperature incineration, and salvaging and recycling or other methods you may wish to explore later.

The American Society of Civil Engineers defines a sanitary landfill as follows: "a method of disposing of refuse on land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operation or at such more frequent intervals as may be necessary".

Fresno, California, and New York City were the first cities in the United States to use sanitary landfills in the 1930's. Now over 50 percent of all refuse collected in the United States is disposed of in sanitary landfills. As more and more states are passing air quality and other legislation which restricts other methods of solid waste disposal, sanitary landfills appear to be the logical solution. Sanitary landfills eliminate the rat, fly, and disease problems, but there is the possibility of polluting ground waters. The liquid runoff after rain and/or floods percolate through the compacted garbage can be a potent blend of chemicals capable of much damage.

Sanitary landfills do pose fewer pollution problems than any other method of waste disposal now available. This method has helped reclaim worthless land in many urban and rural areas. Many golf courses, parks, and even housing developments have been built on sanitary landfills, which were once ravines or gullies or marsh land. Unfortunately, a city or rural community someday runs out of such areas to use as landfills and must seek other, more expensive land. New York City for years used about 200 acres of low swampy land per year, but that type of land is either rapidly disappearing or environmentalists are obtaining court injunctions to stop such methods of disposal.

San Francisco has filled in much of its Bay area with solid waste and part of the city now is built on areas that once were part of the Bay or its estuary system. The Bay area is now less than two-thirds its original size. Unfortunately that too has caused adverse effects on crustacean and other forms of sea life. There also is considerable evidence that both people and wildlife suffer from more air pollution, etc., if more of the Bay area is filled in.

There must be a tradeoff in any activity we engage in. Loss of fish and wildlife habitat for years was considered a small price to pay for the recovery of high valued land, and the cheap disposal of solid wastes. However, "quality of life" now is deemed much more critical for society, and certain groups are vehement in their protests that people must be able to enjoy all the "goodies of modern society" in a natural environment as pure and idealistic as was enjoyed by Robinson Crusoe and his man Friday!! Seriously, the resulting environmental problems from solid waste disposal are real, and we must initiate research into the magnitude of problems such as percolation runoff in landfills, and seek solutions to them. In the shorter-run, however, you and your community leaders should look for sites least likely to affect underground or surface water sources.

Proper site selection is the key to an "esthetically-oriented" landfill. To keep the cost of hauling within reason, the site should be located near to the source of solid waste. If the landfill site is to serve two or more communities, then present waste production volumes, as well as projections of future population and industrial growth must be projected to determine where the least-cost site will be in 10 or 20 years.

However, cost is not the only factor in site selection. Good access roads (all weather roads) to the site are a must. Characteristics of the soil, the potential for ground and water pollution, and eventual use to be made of the acreage in the completed landfill, are all key factors to consider. Completed landfills have been used for recreational, residential, business and industrial sites, with little or no settling problems encountered. Obviously, multi-story apartments, or office buildings or plants should go below the bottom of the landfill to construct footings.

The cost of solid waste disposal using a sanitary landfill is generally less expensive than other methods. Operating costs estimates vary from $.50 per ton to abour $4.00 per ton. A recent survey found that the average cost of operating 360 landfills was abour $1.05 per ton. This included amortization of landfill equipment and the land cost [8, p. 29].

Labor requirements will vary by the method of receiving solid wastes, the type of site (area or trench or a variation of these), and the number and size of loads and type of equipment being used. In a survey of 38 cities with a population of 15,000 to 50,000, 15 of them used one man to operate the landfill, 18 used 2 men, and 3 cities used three men. Equipment requirements are usually one of the following bulldozer, front end loader, drag line shovel, scraper, backhoe, or some combination of these.

POTENTIAL USE OF SOLID WASTE MULTIPLIERS

Obviously, by now all of you are thoroughly familiar with input-output models and interindustry analysis. If we know how many pounds of solid waste are generated in each sector per employee per year, and the resulting product output, we can utilize this information to develop waste generators or multipliers. In other words, if we attract a new textile plant or some other industry to an area, we must consider not only the solid wastes it will generate in its production process. It will stimulate production and consumption on other sectors of the local economy, resulting in increase in solid wastes in those sectors.

Certainly, community leaders must consider the load factor on existing and planned facilities for both sewage treatment and solid waste management as new industry is attracted to an area.

The waste per employee ratio is usually measured in thousands of pounds per employee per year (KPYE) [5, Sec. II, p. 4]. Examples of some activities which are applicable to Oklahoma are:

Activity	KPYE
Cotton ginning	63.0
Supermarkets	35.7
Stockyards	260.0
Rubber	11.9
Paper	19.4
Textiles	2.5

The average for all manufacturing industries (excluding sawmills) in Oklahoma is 7.4 KPYE.

George Muncrief of our department has done some preliminary work with an input-output model to develop solid wastes multipliers. Use of such multipliers will allow more accurate projections of total amounts of solid waste generated as well as determining impacts of employment changes due to new plants locating in the area, or expansion of existing plants.

PROSPECTS FOR THE FUTURE

The rural water and waste disposal facilities program received a boost in May, 1971, as FHA loan and grant authority was increased from $160 to $260 million for the 1971 fiscal year. The increase is enough for 500 additional water, sewer, and solid waste disposal projects in rural communities. This program should help some rural communities in Oklahoma in planning better solid waste management practices.

Much technological research is underway on new incineration methods for solid waste disposal. New equipment for separation of the wastes for recycling is also being perfected. The University of Pennsylvania has been working on a demonstration project for applying pipeline technology to the collection and removal of domestic solid wastes via a slurry. Large industrial complexes such as General Electric have promoted kitchen garbage disposers as one means of getting rid of garbage. This obviously means the sewage treatment plant gets a bigger load!

Railroads such as the Southern Railway System are promoting the use of railroads for hauling solid waste away from the area where it is produced. They visualize compressing and sanitizing city refuse, and hauling it to sites that need landfill. This method could also be used for separated wastes for recycling. But it may not be the feasible solution for Choctaw or McCurtain County, Oklahoma.

Retail giants such as Sears are promoting compacting machines for kitchen use. These machines take a week's garbage and compress it into a small block that fits into a bag about the size of a large grocery bag. This may save some time in collection and make for slightly less bulk in the collection trucks, thus creating some economies. However, most newer collection trucks do some compacting as the solid wastes are loaded, and a heavy bulldozer certainly can compact the material in the landfill into "as small as bundle" as the $200 kitchen-installed compacter. Thus economies at the landfill site may be small.

Obviously recycling and reuse is the key to smaller landfill and/or incineration requirements. But the separated wastes must be accumulated in volume before economies in transport to recycling plants can be obtained. Some rural communities may find it difficult to justify the cost of such separation equipment, the additional storage requirements, and transportation costs. On the other hand, sale of such recycled products may be the key to survival of some large cities, in that such receipts may help keep their solid waste disposal costs within reason.

As has been indicated sanitary landfills to fill in ravines, gullies, swamp lands, and other undesirable areas have helped salvage thousands of acres of land for beneficial uses such as parks, industrial and residential sites, etc. However, a new wrinkle is being added. Virginia Beach, Virginia, and Chicago are extending their sanitary landfills into the sky. Each city plans to make a huge man-made hill for development into recreational areas. Tobogganing, skiing and other sports will rise and fall on the rubble!

Your crystal ball and brain power can be put to work now. What can you envision for your rural communities in their efforts to properly handle the solid wastes which are accumulating along roadsides, in parks, and in other unwanted places? One project you can begin is an educational program to redirect thinking of the citizens and to show them the value of proper disposal to their communities, for example to their property values, industrial development and tourism development. Solid wastes management includes doing something to disguise or eliminate unsightly junk yards, and abandoned farm equipment as well as cars and trucks.

You need to encourage several rural communities and/or counties to work together to develop a system that will result in some economies of scale. You need to help the community leaders track down sources of grants and other financing means, long-term and low interest loans, etc. Area solid waste management plans, such as that developed by the Southern Oklahoma Development Association (SODA) are a prerequisite for obtaining funding consideration from federal sources.

Use your imagination, ingenuity, and cooperative spirit. Primarily what is needed in most rural communities is not to focus on the problem. Focus on alternative solutions and strategies for attacking the problem. Provide some guidelines for your community leaders. Help them envision solutions that take care of potential problems of solid waste accumulation 20 and 30 years ahead.

The greatest void in solid waste management is the lack of information on permeability, leaching, and other soil characteristics as the adjacent soil is affected by the solid waste in the sanitary landfill. The percolation of water through old batteries, pesticide containers and other junked items containing chemicals has the potential to cause pollution problems for both underground water and downstream surface waters. Still a properly managed sanitary landfill is the best method of solid waste disposal for most rural communities.

Much research is also needed in the area of land requirements and facilities performance for rural communities with varying economic bases. Thus, a community with a textile plant economy and fairly low income base will have a different sanitary landfill requirement than a community where the majority of residents are middle income workers (with strong union support) working in a steel mill or automobile manufacturing plant.

We need to develop an information system which will allow us to project long term needs of the community for disposal sites (sanitary landfill sites). Growth indicators such as potential for industrial development, population and income projections, etc., are part of the data needs if local governments are to develop adequate long range plans for solid waste management. Proper site selection and purchase of properly located landfill sites early in the game so as to tie in these locations to comprehensive planning and zoning is most important. Otherwise, future undirected housing developments may end up too near to the most efficient (from both technical and economic standpoints) landfill locations. Thus planning and zoning to delineate industrial, commercial, and residential areas within the area are important steps in solid waste management. This is particularly relevant for local communities "in the path" of projected growth, such as those counties along the McClellan-Kerr Arkansas Navigation System from Catoosa to Fort Smith.

Solid waste management is a completely new area for most cities and rural communities, primarily as a result of recent Federal and State legislation. When a community has relied on open dumps or open dump burning for years, very little knowledge is accumulated on the management aspects of sanitary landfills. Not only is this aspect critical for rural communities; development of a practical solid waste management program has been hampered by lagging technology, high costs of equipment and pollution hazards from some improperly selected and/or improperly managed landfill sites. Solutions will become available for most of these problems, as greater emphasis is being placed by EPA and other agencies on research and demonstration grants to develop new technology for solid waste management. However, unlike the song which goes "the best things in life are free", these new technologies will be even more costly! So in working with your community leaders on long range planning of solid waste disposal, you should insist that an education program also be initiated to inform the residents that the good quality environment they are seeking will cost them via higher monthly service charges for solid waste collection and disposal. With that point, I'll leave you--up to your neck in solid wastes, and hearing the words from an old refrain sung by a host of angels: "Let Us Count Our Blessings That We Have Solid Waste To Dispose Of. Many Others In This World Are Not So Lucky As We!"

SELECTED REFERENCES

[1] American Public Works Association, Refuse Collection Practice, Public Administration Service, Chicago, Illinois, 1958.

[2] American Society of Civil Engineers, Civil Engineering Manual of Practice, No. 39, Sanitary Landfill, 1959.

[3] Badger, Daniel D., "Recent Environmental Quality Legislation Important to Agriculture and Rural Areas in Oklahoma", A.E. 7008, Dept. of Agricultural Economics, Oklahoma State University, Stillwater, Oklahoma, April, 1970.

[4] Barrett, Dean, Solid Waste Management by Sanitary Landfill, OSU Extension Facts Sheet 817, Oklahoma State University, Stillwater, March 1971.

[5] Bureau of Solid Waste Management, Technical-Economic Study of Solid Waste Disposal Needs and Practices, Volume IV, SW-7c, U.S. Department of Health, Education and Welfare, Rockville, Maryland, 1969.

[6] Huie, John M., Solid Waste Management (Storage, Collection and Disposal), Cooperative Extension Service, Purdue University, Lafayette, Indiana.

[7] Jones, Jack, Solid Wastes, MP-989, Texas Agricultural Extension Service, Texas A & M University, College Station, Texas, March, 1971.

[8] Klee, Albert J., "The Role of Facilities and Land Disposal Sites", in Interim Report 1968 National Survey of Community Solid Waste Practices, U.S. Dept. of Health, Education, and Welfare, Washington, D.C., 1968.

[9] Muncrief, George E., "Development of Solid Waste Multipliers", unpublished term report for AGEC 5503, Dept. of Agricultural Economics, Oklahoma State University, Stillwater, January 4, 1971.

[10] Oklahoma State Department of Health, Sanitary Landfill Operation, O.D.H. Engineering Bulletin No. 0523, July 1, 1969.

[11] U.S. News and World Report, Our Poisoned Planet: Can We Save it? Washington, D.C., 1970.

[12] Vaughan, Richard D., "Solid Waste Management: The Federal Role", Bureau of Solid Waste Management, U.S. Dept. of Health, Education and Welfare, Washington, D.C. 1969.

PLANNING FOR WATER SYSTEMS IN RURAL ECONOMIC DEVELOPMENT

Gordon Sloggett*

INTRODUCTION

The objective of planning for water supply in rural economic development is to provide a sufficient quantity and quality of water at the proper time and at the lowest possible cost. The problem then, is twofold. First, what is a sufficient supply; and second, how to provide that amount at the lowest possible cost. All elements of the planning process need careful attention because if one part is left half done or undone, failure to meet the objective is very probable.

An example where one aspect of community planning was neglected occurred in a southwest Oklahoma town and it dealt with the source of their water supply. The persons responsible for the planning estimated how much water they would need and found that the most economical available alternative source of water was to construct a reservoir.

The reservoir was built, the pipeline was installed, and the water began to flow into the community distribution system. Unfortunately, the water had a peculiar quality about it that caused a health problem among the population. Treatment costs to make the water palatable and safe to drink turned out to be so expensive that the reservoir and pipeline are now not in use. This was a very expensive error in planning and points out the importance of doing the total planning job.

OBJECTIVE

There is no magic formula to use in planning for water system needs in rural economic development because each situation presents a different "set" of problems. There are, however, important basic factors that have to be considered in planning a rural water system. A consulting engineer will be responsible for designing the system but many things need to be done before this stage is reached. Basic factors to consider include: the number of years to be issued in the plan; the quantity of water demanded in that time span; where to get the water; the area to be served by the water system.

Planning Period

Since a water system involves a large fixed investment, it must be amortized over a long period of time. The Farmer's Home Administration loans for rural community water systems may extend over a period of 40 years, for example. In a growing community, the water system should be planned and built to accomodate growth expected in the demand for water.

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*Agricultural Economist, USDA, ERS, NRED, stationed at Oklahoma State University, Stillwater.

The amount of the excess capacity needed to accomodate the expected growth is determined by comparing the cost of the excess capacity at one point in time with the cost of increasing the capacity at some future time when the original excess capacity is utilized. Judgment will be relied on heavily in this decision because current costs and interest rates must be compared with expected costs and interest rates, with the costs in both cases being related to expected growth. Thus, it is important that good economic base data be available to supplement judgment in this decision.

Demand

The quantity of water demanded at any point in time can be divided into two use classes: domestic and industrial. Domestic water use is by far the easier of the two to project into the future, assuming that relevant population projection data is available. Many estimates of future population are available; but an estimate from an economic base study for the area in question will provide an excellent source for population projections.

Once the population projections are selected, water use per capita with adjustments for changes in residential use over time can be multiplied times the population projections to obtain domestic demand.

The estimated total water withdrawn by public supplies in 1965 was about 157 gcd (gallons per capita per day). This included water for domestic, commercial, and public uses. In contrast, estimates of water withdrawals for rural domestic uses ranged upwards from 50 gcd for rural households with running water.

The current rate of change in residential water use in the United States is estimated to be increasing by 1.5 to 2 percent per year. Perhaps 100 gallons per day should be used for planning purposes unless local data are available on per capita water consumption.[1/]

In addition to the number of houses, three factors have been determined to affect residential water use more than any others: economic level of the consumer, climate, and the local water pricing policy. Water use by residents on a flat-rate system tends to be higher than for those on a meter system--about twice as much for

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[1/] Linaweaver, F. P., Jr., John C. Geyer, Jerome B. Wolf. "A Study of Residential Water Use", U.S. Government Printing Office, Washington, D.C., 1967, p. 3.

sprinkling purposes, for example.[2] Therefore, in estimating future residential water use, it is necessary to know what the present pricing policy is and what the policy is likely to be in the future.

Income and climate have obvious effects on water use and should also be considered in projecting residential use. Although the weather will remain fixed in the analysis of future residential usage, income in the area may change relative to present incomes, thus influencing water use. Information on which to estimate income changes will also be available in a good economic base study.

The maximum daily water demand may be a more important factor in planning a community water system than the per capita average. In recent years, peak demands for water have increased faster than yearly averages. For example, in many communities lawn sprinkling demands have often caused water tanks to empty and low pressure conditions to occur, not because of inadequacies in the source of water supply, but because of inadequacies in the distribution system. Restrictions on use have become commonplace during the summer months throughout the country. Water supply and distribution facilities must be designed to meet these peak demands. But because of seasonal and hourly water use patterns, considerable capacity may be idle much of the time.

Industrial use projections are much more difficult to make because of the large variation in requirements by type of industry. Changes in water use over time by existing industry is also difficult to predict due to changes in technology, which may bring about large abrupt changes in water use. In rural areas, planning for additional water supply for potential new industry is extremely difficult because of the factors just mentioned and because there is presently little or no industry in many rural areas.

One solution in estimating future industrial use is to analyze present industrial requirements and then adjust this amount for changes that have occurred in the past. An alternative is to look at economic base study results and estimate which types of industry are likely to locate in the area. There are large differences in water requirements by types of industry, i.e., agricultural processing requirements are only one third of mining requirements.[3] This makes it necessary to consider potential new types of industry in industrial use projections. Large investments in a rural water system for this potential may not be reasonable but this possibility should be considered in planning.

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[2] Linaweaver, F. P., Jr., John C. Geyer, Jerome B. Wolf. "A Study of Residential Water Use", U.S. Government Printing Office, Washington, D.C., 1967, p. 79.

[3] Fletcher, Robert R., Impact of Economic Development on Water Resource Use, Unpublished Ph.D. dissertation, Oklahoma State University, 1971, p. 85.

Supply

Once demand for water has been estimated, the problem is to provide that amount at the lowest possible cost. First, a survey of the present water supply situation in relation to future needs, in terms of quantity, quality, and economy is required. It is possible that the current water supply system will meet all requirements in the forseeable future. However, there are many rural areas in Oklahoma with inadequate or nonexistent water systems. It was estimated recently that there are as many as 400 rural communities in Oklahoma in need of improved water facilities. This includes communities without any water system and also those with inadequate systems.

Three basic factors to consider in supplying water needs are as follows: source of supply, treatment requirements, and the distribution system with respect to the number and density of users. Potential sources of supply include purchasing water, treated or untreated, from an existing system; wells; rivers or streams; surface storage; or some combination of these sources.

Generally speaking, the cheapest source of water is shallow wells, followed by rivers and streams. Surface storage is generally the most expensive if dam construction is necessary. Deep-well water costs vary with depth and diameter. The purchase price of water from an existing system is subject to negotiation and should be considered along with the other alternatives. One very important thing to do before progressing very far in selecting a water source is to check on water rights. The Oklahoma Water Resources Board can provide this information.

Water treatment costs can have a significant effect on the relative costs of different sources of supply. Well water of poor quality may be more expensive than good-quality surface water when treatment costs are included. Therefore, before a final selection of a water source is made, be sure to have the water thoroughly analyzed.

Source of supply and treatment are very significant in planning for water supply at the lowest possible cost. But, there is really very little the planner can do in these two areas because of natural limitations on the sources of water and its inherent qualities. However, the planner can have a significant influence on the selection of a distribution system, which in turn has a considerable effect on costs per user. As an example, the Farmer's Home Administration loans to rural water districts in Oklahoma range from $320 to $3,600 per user. Much of this range in cost can be explained by the density of houses and the number of users.

Planners can probably have more effect on the number and density of users of rural water systems than on any other factor affecting the cost to the user. Therefore, anything done "within reason" to increase the number of users and their density will tend to reduce the cost of water per user. The number of users can be affected by simply increasing the area served by the planned water system, but this would not be effective if the area is very sparsely populated.

Not much can be done about the present distribution and density of population but through zoning, as was discussed earlier, planners can have a significant effect on both of these in the future. A research project getting underway this summer at OSU, in cooperation with USDA, deals with the economics of water systems in rural areas. The results of this project should be useful to planners and, in particular, to the questions of distribution and density of the population served.

Area

At the present time in Oklahoma nearly all new water systems in rural areas are FHA-financed system. In this case the "within reason" limitations are, in effect, the limitations under which FHA loans are made. The reasonableness of these limitations is not in question. In fact, there are some 70,000 farm and rural families served by FHA-financed water systems in Oklahoma that might not have had the benefits of a public water system without the loans. The point is that in planning for the future, it is possible to plan beyond present FHA standards and policies. Of course, plans for the very near future must meet current regulations.

Regional water systems, or at least county-wide systems, are not at all out of reason for the future in Oklahoma. Several states, including Washington, Louisiana, and North Carolina, have some regional or county-wide water systems. Other states, including New York, Ohio and Maryland, have passed legislation favorable to this type of water system developed.[4] Current Federal legislation dealing with economic development planning and programs is leaning more and more toward a regional approach.

Three primary advantages of regional or county-wide systems are the opportunity for better management, economies of size, and service to more of the population. Small water systems simply cannot afford to hire full-time professional management and as a result, maintenance, quality control, development, and other managerial tasks often suffer. This problem has been recognized in Oklahoma and a state-wide organization of rural water districts was recently organized. One of the objectives of the organization is to improve the overall management of rural water systems.

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[4] Proceedings - Symposium on Water and Sewer Services for Small Communities in North Carolina, Institute of Government, University of North Carolina, Chapel Hill, North Carolina, December, 1968, pp. 95-100.

Economies of size is another advantage of county or regional systems. The amount of the economies attainable will be limited by the density of the population in the area to be served. Estimates have been made of a 60 percent cost reduction per mgd (million gallons per day) by increasing the size of the delivery system from 5 mgd to 50 mgd. Savings of 50 percent have been realized in transmitting water by increasing the size from 1 mgd to 2 mgd. The unit cost of well water can be cut as much as 1/3 by using a 1 mgd well rather than a 0.2 mgd well.[5] Similar savings, brought about by these larger volumes, are possible in other cost components of water systems.

Another advantage of regional or county-wide water systems is the possibility of providing water service to parts of the population that may not otherwise be able to afford it. It could be that these systems might do for water supply what rural electrification did for electricity in rural areas. The FHA-financed water systems are doing this in some areas today, but it's possible that their customers could be receiving even better water service at lower costs under regional systems.

Although there are advantages to regional or county-wide systems, particularly in the area of economic efficiency, such a plan will have to overcome some serious obstacles before it can be implemented. Regionalization of water systems will have to overcome some of the same community opposition as did the regionalization of school systems. Communities do not like to lose control over their public services. The benefits of regional water systems may be large enough in some areas to overcome the opposition.

CONCLUSION

Planning a water system to provide an adequate quantity and quality of water at the right time and at the right price is a difficult task. The task will be much easier if adequate planning information is readily available. A good economic base study will provide much of this information.

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[5] Ibid, p. 96.

AVAILABILITY OF RETAIL AND BUSINESS SERVICES TO RURAL POPULATIONS: APPLICATION TO SOUTH CENTRAL OKLAHOMA

Dave Flood and Dean Schreiner*

Changes in the economic and social structure of rural Oklahoma have been many and diverse. All too frequently the agricultural segment, which by far has sustained the greatest structural change of any rural group, is puzzled by the changes that are occurring in the retail, business, and public service sectors of the nonagricultural rural economy. Many goods and services which were previously available in the local trade center are no longer available in that center but must be purchased at a larger more distant center. Some rural communities that served as agricultural trade centers no longer exist. Others may not exist in the future. Some centers will grow faster than others with no apparent differences in the activities composing their economic base. Others will change dramatically because their economic base will expand due to new manufacturing or recreational activities.

Despite the apparent complexity of growth and decline of rural communities, a set of economic forces can be used to explain the availability of goods and services to rural populations. Central place theory describes the results of these economic forces and gives a ready classification of service availability by center size. This paper briefly outlines central place theory and then applies the theory in describing the locational availability of services in South Central Oklahoma. The data supports the hypothesis that in general the order (complexity and size) of a trade center is related to the distance from a higher order trade center. As a final part of the paper, certain implications are drawn as to expected changes in rural communities.

CENTRAL PLACE THEORY[1]

Central place theory attempts to explain the location, size, nature, and spacing of economic activity. The theory has been used to explain the range of goods and services offered to consumers in towns of different sizes. The towns, or central places, may be ranked according to their relative importance within the region. And there is a natural tendency to do this as common usage distinguishes among villages, small towns, towns, and cities. In central place theory, higher order centers are more complex, offer a greater range of goods and services, have more retail establishments, and serve a larger area than lower order centers. Lower order centers supply a lesser range of goods and services to a

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*Research Assistant and Associate Professor, Department of Agricultural Economics, Oklahoma State University, Stillwater.

[1] For more complete presentations of central place theory see Brian Berry [1], Walter Cristaller [3], and John Marshall [5].

smaller area. Typically, the lower order centers supply only those goods and services which require frequent purchase. For a defined region, such as a multi-county planning region, the various centers are linked as a system of centers and provide a whole range of goods and services to all the inhabitants of the area. This system, however, imposes definite limits on the potential service function of any particular center.

There are two questions a planner might ask: 1) How does this system arise? and, 2) What is the nature of these limits to the potential development of a system of cities? For expository purposes, imagine a flat homogeneous plain. On this plain, natural resources, including population, are evenly distributed. Income is evenly distributed and the people of the region have the same tastes and preferences. Further, transportation costs are equal in every direction and proportional to the distance traveled. At first glance, there might seem little reason for a system of differently sized cities to arise, but there are economic forces which will bring this about.

Locational Demand for Goods and Services

Suppose a certain good, which we will call good n, is made available for sale in the region. It may be located at any point in the plain. Since the purchaser of good n pays not only the given price of the good but also the costs of transportation to and from the site of sale, the actual price of the good increases with distance from the site. We would expect, then, that the quantity of good n demanded decreases with increasing distance from the site where it is offered for sale. This relationship is shown in Figure 1. DnDn represents the demand curve for good n, showing the quantity of the good demanded associated with various prices. For a person living at the site of sale, the price of the good is OP. Therefore, the quantity demanded will be OQ. For a consumer located k miles from the center, the price of the good is OP + kt (where t is the cost of transportation per unit per mile). For those living at this distance, the quantity demanded is only OU. At some distance from the center there will be no effective demand for the good at

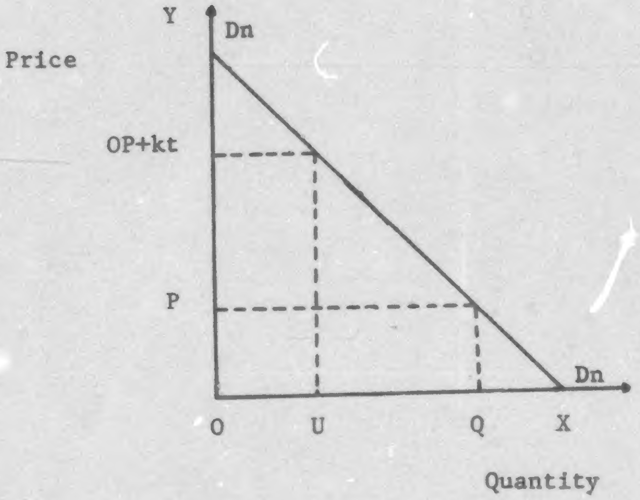

Figure 1

the "distance adjusted" price. Costs of transportation impose a limit to the "range" of a good. The range of the good can be defined as "the distance up to which the dispersed population will still be willing to purchase a good offered at a central place" [Cristaller, p. 22].

This analysis can be expressed in terms of a demand cone.[2] We consider again good n being sold for price OP at a central place. In Figure 2, EF and GD represent the north-south and east-west lines of geographic space which intersect at O, the site of the central place. As before, the quantity of good n demanded is OQ, which is here expressed as a vertical axis. At a distance k miles from the center, measured along the geographic axis, the quantity demanded is OU (expressed vertically). At some further distance, say h, the quantity demanded is zero. Thus a cone is generated whose sides slope down from the vertical axis OQ.

The two major properties of this cone of interest are:

(1) the quantity of the good demanded at any distance from the center is given by the heighth of the cone at that point (verticals OQ, OU).

(2) the volume of the cone multiplied by the population density (uniform on the plain) gives the quantity of output sold.

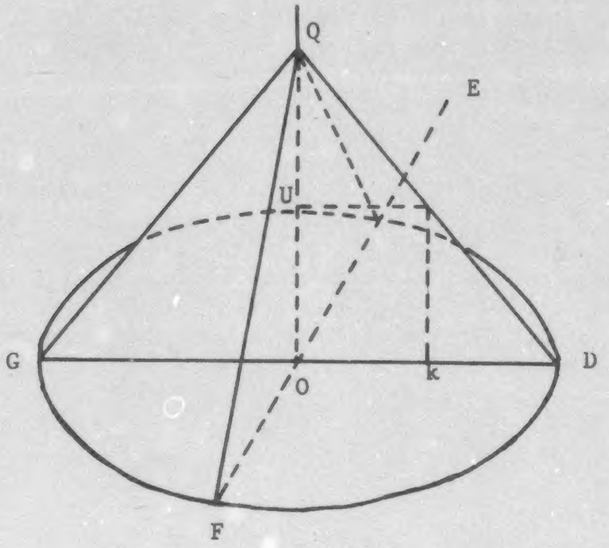

Figure 2. Demand Cone

Within this demand cone, we can see the interrelations among price, range, transportation cost, population density, income distribution and the volume of business. For example, a price higher than OP at the center would result in a decrease in the quantity demanded at the center and at all distances from the center. This implies a smaller trade radius and a lower volume of sales. Better transportation may lower the costs of transportation for consumers at every distance from the center, thus increasing the quantity of goods demanded at the central place.

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[2] See Hugh Nourse [7, pp. 18-22].

Locational Supply of Goods and Services

On the supply side, it is clear that a supplier must receive a certain minimum level of receipts to continue to offer the good for sale. He must cover his costs and receive a normal rate of profit. To do so, he must (given our assumptions about preferences and income distribution) reach a certain minimum number of consumers who spend a portion of their income on his product. This lower range "is determined by the minimum amount of consumption of this central good needed to pay for the production or offering of this central good" [Cristaller, p. 54]. This minimum number of consumers the supplier must reach is called the "threshold" population of the good. The relationship between the number of consumers reached (given by the range of the good) and the threshold population level is then critical. In order for a good to be supplied at the central place, the population within the range of the good must exceed the threshold population of the good. This situation is shown in Figure 3 in which OA represents the minimum range within which the threshold population falls for the good and OB the range of the good. Receipts from sales to the population living in the shaded portion are considered "excess profits."

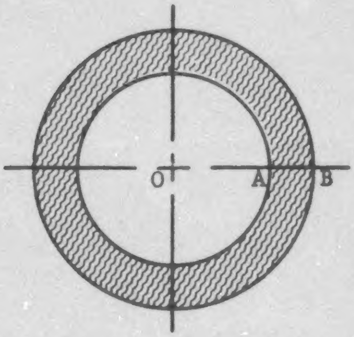

Figure 3

Suppose other entrepreneurs, noting the profits to be made in the sale of good n, move into the region to offer good n to the inhabitants of the plain. Assuming that as many suppliers as possible locate on the plain so that no consumers are left unsupplied, the pattern of location will resemble, "the packing of round plates on a table" [John Marshall, p. 14]. This is shown in Figure 4. These centers are "A" centers.

The trade radius will be in this case, congruent with the threshold level of population necessary for it to be just profitable to supply the good. Simply, as competing centers move onto the plain, the area of excess profits is removed as new suppliers compete for the business of the inhabitants of the region.

Of course there are many types of goods, each with its own particular range and threshold level. If we rank these goods by ascending threshold level from 1 to n, such that good n is the highest order good, we can generate the process of the ordering and spacing of towns. Good n is supplied in the "A" centers, but the suppliers are not earning excess profits (as indicated in Figure 4). However, good n-1, having a lower threshold population than good n, will derive excess profits by locating

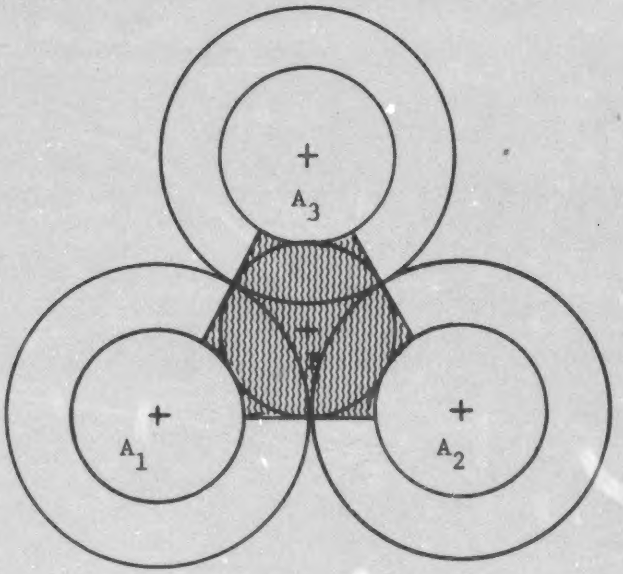

Figure 4. Suppliers of good n will locate at A centers while suppliers of good n-p and all lower goods will locate at center B.

in an A center. By locating in the "A" center, the supplier derives the benefits of the larger trade area (which exists for good n) but has a lower threshold level.

As we move down the list of goods, the threshold value of the goods declines. A good will be reached, say good n-p, "for which the interstilial buyer power available as excess profits will in fact be large enough to permit suppliers of good n-p to establish themselves not only in the A centers, but also in the interstices between these centers" [Marshall, p. 16]. This is shown in Figure 4. By locating in the center of the triangle formed by the A centers, a supplier is able to capture a sufficiently large part of the market for good n-p, and for all goods with a lower threshold level. There is enough buying power surrounding point B which is "excess" to suppliers in points A that it becomes economic to supply good n-p in the B center. The excess profits accruing to the suppliers of good n-p in the A center are removed from this portion of the plain. This new center (a "B" center) cannot, however, supply any good with a threshold level higher than the threshold level of good n-p. Thus proximity to larger, more complex centers, imposes limits on the development of trade center activity among centers within a trade center system. A clear hierarchy of centers emerges.

CLASSES OF CENTERS IN SOUTH CENTRAL OKLAHOMA

This sort of analysis has been applied to the rural towns in Planning Region 9 of South Central Oklahoma. We attempted to determine: (1) if there exists a clear differentiation of towns based upon the range of goods and services provided and, (2) if such a differentiation exists, what relation does it have to distance from the larger towns in the region.

Establishment Data

The total number of establishments in the towns of less than 5,000 population were broken down into 35 different groups. Data were available from another study by George Muncrief [6] which utilized telephone directories and various other registers to obtain the population of establishments. An ordering of the data was made by town according to the total number of establishments and the presence or absence of a particular group of goods and services. In a horizontal direction, the towns are ranked by number of establishments from highest to lowest. In a vertical direction, the 35 sorts of establishments are ranked from lowest to highest threshold level.

Range of Goods and Services

Consider the example of ordering in Figure 5: towns are ranked from A, having the greatest number of establishments to C, having the least number of establishments. On the vertical axis, the establishments are ranked by threshold values. Gas stations begin to appear in towns of very low population, while jewelry stores do not appear until the towns are much larger. If the system is perfectly differentiated, the system pictured in Figure 5 might arise. Here only the largest center

Towns Estabs.	A	B_1	B_2	C_1	C_2	C_3	C_4
Gas Station	Full	Full	Full	Full	Full	Full	Full
Grocery	Full	Full	Full	Full	Full	Full	Full
Drug Store	Full	Full	Full				
Farm Equip.	Full	Full	Full				
Household App.	Full						
Jewelry	Full						

Figure 5

supplies all the goods and services; cities of middle range (B_1 and B_2) supply only four of the six types of goods; while the smallest centers supply only those goods with very low threshold levels, gas stations and grocery stores. Here one could distinguish three orders of towns based on the range of goods and services supplied. Subclasses within a class (i.e. B_1 and B_2) indicate proximity to more than one higher order central place (See Figure 6).

This same analysis was applied to the 47 small centers (less than 5,000 population) in the region. The results were roughly similar (Table 1). We found three classes of towns: class A towns supplied a nearly full range of 35 different kinds of establishments; a group of centers called B centers supplied a less complete range of goods; while small C centers provided only a few goods of low threshold values.

To get an idea of the range of goods and services which differentiate the centers the following classifications were derived:

Class 1 activities:	found in all sizes of centers and include; gas stations, grocery stores, beauty salons, and churches.
Class 2 activities:	not found in the smallest towns, but found in both the B and A centers and include; drug stores, auto repair shops, laundromats, farm equipment, auto parts, auto dealers, and physicians.
Class 3 activities:	found only in the largest centers and include; nursing homes, clothing stores, legal services, novelty stores, and jewelry stores.

A rule of thumb was used to establish the population threshold levels by activity.[3/] We chose as the threshold level of an activity the lowest population after the first appearance of the activity such that in any sequence of four towns at least two establishments were found. We wanted a value that very simply showed that below this value the activity appeared only sporadically, while above this value it appeared frequently. The rule of thumb filled this function.

Table 1 shows the threshold population by activity for the south central region of Oklahoma. The threshold population levels do not mean that the service will not appear in smaller centers but only that the frequency of the service is less for this particular region. Certain extenuating factors may contribute to the presence of a service in a center below the population threshold level. As an example, motels and hotels appear in class 2 activities and class B towns. However, if a class C town is located on a major highway or a major recreation spot

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[3/] See Brian Berry and William Garrison [2] for a statistical formulation in establishing threshold levels.

Table 1. Classification of Activities by Threshold Population and Town Class

Activities	Threshold Population	Range of Number of Establishments by Town Class	Range of Population by Town Class	Number of Centers
Class 1 Activities: Class C Towns		1-24	121-1,271	23
Gas Service Station	121			
Grocery Stores	123			
Churches	129			
Agric. Services & Supplies	129			
Beauty Salons	165			
Eating Places	165			
Class 2 Activities: Class B Towns		30-73	611-1,640	19
Bottled Gas	228			
Drug Stores	228			
Auto Repair	424			
Lumber Yard	434			
Insurance Agency	439			
Repair Services	439			
Laundry & Laundromats	492			
Drinking Places	587			
Package Liquour	611			
Variety, Dept., Gen. Merch.	611			
Florists	611			
Hardware & Paint	611			
Farm Equipment	618			
Furniture & Appliances	636			
Auto Parts	706			
Auto & Boat Dealers	706			
Physician's Office	706			
Hotels & Motels	722			
Class 3 Activities: Class A Towns		80-113	1,723-3,995	5
Nursing Homes	840			
Real Estate Agency	840			
Clothing Stores	950			
Sporting Goods	1,271			

Table 1. (continued)

Activities	Threshold Population	Range of Number of Establishments by Town Class	Range of Population by Town Class	Number of Centers
Specialty Retail	1,354			
Legal Services	1,524			
Dentist Office	1,524			
Specialized Health	1,640			
Gift & Novelty	1,640			
Jewelry Store	1,862			
Accounting Services	2,611			

one or more such facilities may be located in that town. Farm equipment dealers are classified in class B towns. A less agricultural region may classify this activity in a class A or even higher central place.

Of further significance in Table 1 is the overlapping of population ranges by class of town. Towns were classified according to number of establishments; class C towns have from 1-24 establishments, class B towns have 30-73 establishments and class A towns have 80 or more establishments. However, class C towns have a population range of 121 to 1,271 whereas class B towns have a range of 611 to 1,640. Our earlier discussion on central place theory assumed evenly distributed natural resources, population, and income; and similar tastes, preferences, and transportation costs. We know that this is not true for all regions. Centers in more sparsely populated regions offer a greater array of services for a given population base than do centers in more densely populated regions. Our sample shows that class C towns in the upper end of the population range are built up areas or serve as bedroom communities for a metropolitan area. Many class B towns have a lesser population but offer many more services.

Distance Factors Separating Centers

We further hypothesized that the complexity of a city--its order--is related to its distance from the nearest large urban center. We would not expect to find A centers near the urban centers (over 5,000 population); B centers might be located somewhat nearer the urban centers and some may be grouped around A centers and hence at a greater distance from the urban centers. Class C centers may be of four types: (1) grouped around the urban centers; (2) grouped around A centers; (3) grouped around B centers that are grouped around urban centers; and (4) grouped around B centers that are grouped around A centers. Figure 6 shows a hypothetical network of cities for the maximum number of linkages.

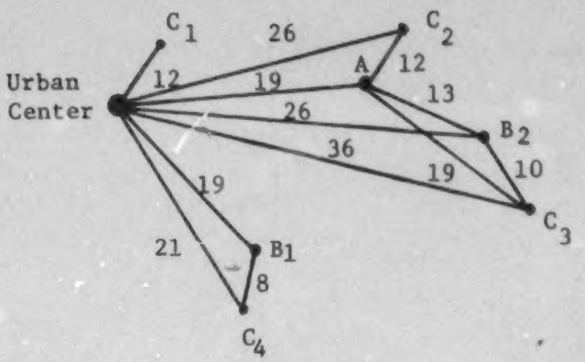

Figure 6. Network of Centers with Average Distance Between Centers in Miles

To test this hypothesis the average distances between centers corresponding to the network given in Figure 6 were computed. The results tend to support the hypothesis (Table 2):

(1) Class A towns averaged 19 miles from the nearest urban center. Two of these centers are only 10 miles from an urban center. One of the two is characterized by a specialized industrial base. Except for further extenuating factors, the probability of these two centers maintaining their present order relative to the urban center is not very great. The variability exhibited by the other three class A towns is slight, ranging from 23 miles to 25 miles.

(2) Class B towns grouped around urban centers averaged 19 miles from the larger center whereas those grouped around class A towns averaged 26 miles from the larger center. Thirteen miles average distance separates the class B towns from the class A towns. A difference of 6 miles in separating B towns from urban centers versus B towns from A centers indicates the wider influence a larger urban center has on supplying goods and services than the next lower order center.

(3) The small class C towns exhibited the most interesting results. Class C towns grouped directly around an urban center averaged 12 miles from the larger center versus 36 miles for those class C towns grouped around a B center which are grouped around an A center. Class C towns grouped around class B and class A towns which are directly grouped around the urban center averaged 19 and 26 miles respectively and have the expected relative proportions. The wider influence of a larger center upon a lower order center is seen by an average distance of 12 miles separating class C towns from the urban centers and class A towns versus 8-10 miles average distance separating class C towns from class B towns.

Table 2. Distances Between Centers in South Central Oklahoma (miles).

Town	Number of Establishments	Distance from Nearest Town over 5,000 Population	Distance from Nearest Class A Town	Distance from Nearest Class B Town
Class A				
Marlow	113	10		
Waurika	105	25		
Carnegie	101	25		
Walters	92	23		
Comanche	80	10		
Average Class A to 5,000		(19)		
Class B				
Apache	73	18		
Hinton	70	27		
Grandfield	69	28		
Ringling	65	27	22	
Rush Springs	54	21	9	
Temple	53	32	10	
Blanchard	52	19		
Minco	59	15		
Hydro	48	23		
Fletcher	47	19		
Fort Cobb	45	15	12	
Cyril	44	14		
Ryan	44	35	10	
Velma	43	15		
Tipton	40	15		
Tuttle	38	20		
Elgin	37	16		
Cache	32	13		
Binger	30	20		
Average Class B_1 to 5,000		(19)	--	
Average Class B_2 to Class A to 5,000		(26)	(13)	
Class C				
Verden	24	9		
Cement	23	18		4
Terral	23	44	19	9
Alex	22	15		
Eakly	19	39	16	
Davidson	16	12		
Chattanooga	15	23		14
Newcastle	13	14		10

Table 2. (continued)

Town	Number of Establishments	Distance from Nearest Town over 5,000 Population	Distance from Nearest Class A Town	Distance from Nearest Class B Town
Wayne	13	14		
Washington	13	15		
Gracemont	12	8		
Lookeba	11	25		8
Randlett	8	32	23	14
Devol	6	35	25	6
Manitou	5	8		
Dibble	5	24		8
Hastings	5	35	10	10
Indiahoma	4	20		7
Bradley	4	20	7	
Loco	4	28	18	
Geronimo	1	10		
Addington	1	19	6	
Faxon	1	17		
Average Class C_1 to 5,000		(12)	--	--
Average Class C_2 to Class A to 5,000		(26)	(12)	--
Average Class C_3 to Class B to Class A to 5,000		(36)	(19)	(10)
Average Class C_4 to Class B to 5,000		(21)	--	(8)

IMPLICATIONS FOR RURAL TOWNS

Results of our study support the hypothesis that proximity to larger urban centers imposes constraints on the potential service function of a small trade center. It seems, in general, that the urban area of 5,000 or more population has a very strong impact on the provision of retail trade and services for at least a 20 mile radius. Within this radius, it is difficult for centers supplying a wide range of goods to appear. Where this does exist, one might expect difficulties for the smaller center over a longer period of time.

A second point of interest to the planner is the existence of two or more distinct class C centers. The planning problems of supplying rural services in each is of a different nature, and the two must be clearly distinguished. A class C center near a metropolitan area may increase rapidly in population with little or no effect on the number of services provided. On the other hand, a class C center in a sparsely populated agricultural region may lose a significant part of its population base but still offer a wide array of services if it means travelling some distance for a comparable service.

The more general planning implication of the existence of a system of cities is that in planning for rural services zones of influence around cities and the relationships that exist between cities are very important. A simple classification based only on population size can be very misleading. For example, one town of 1,000 plus population in our sample had less than twenty establishments, all of class 1 activities. Classification on the basis of the range of services provided may be more useful for many planning purposes than classification on the basis of population alone.

A major criticism of central place studies is that it doesn't tell us explicitly in which direction a particular town is going. It only describes a system of cities at a given point in time. Some conclusions of an extensive study covering a twenty year period by Gerald Hodge [4] are worth noting in this regard. (1) Smaller centers (in our case class C and B) appear to be the most unstable and least likely to persist as such over time. Towns in these groups will either become class A towns or gradually disappear. In any case the number of such centers will decrease. (2) The rate of decline of small centers increases with increasing proximity to large centers (5,000 plus population). (3) Where centers of the same class are separated by less than the average spacing between centers for that class, one or more of the centers will experience either an absolute or relative decline. (4) As the thinning out of small centers continues, rural residents will have to travel much farther to reach a center offering day-to-day needs such as those presently offered by class C and B towns.

A second major criticism of central place studies is that it is only a partial analysis of city growth or decline. It only describes the trading functions of cities; it doesn't provide an answer to what happens to the economic base or basic employment activities of a city. Some towns will grow independently of what happens to their trade functions because they are adding to their economic base through manufacturing or recreational activity employment. If a significant change in basic employment occurs at one center in a region this is likely to alter the service functions performed by other centers in the region. Thus it is vital that central place studies be part of a larger study that includes elements of growth or decline of basic activity.

LITERATURE CITED

[1] Berry, Brian. *Geography of Market Centers and Retail Distribution*. (Englewood Cliffs, N. J.: Prentice-Hall, Inc. 1967).

[2] Berry, Brian and William Garrison. "The Functional Bases of the Central Place Hierarchy." *Economic Geography*. April, 1958.

[3] Cristaller, Walter. *Central Places in Southern Germany*. (Englewood Cliffs, N. J.: Prentice-Hall 1966).

[4] Hodge, Gerald. "The Prediction of Trade Center Viability in the Great Plains." *Papers of the Regional Science Association*. Vol. 15 (1965).

[5] Marshall, John U. *The Location of Service Towns: An Approach to the Analysis of Central Place Systems*. (Toronto: University of Toronto Press, 1969).

[6] Muncrief, George E. *Development of Interindustry Analysis for Use Within a Public Service Planning Framework to Estimate Generation of Solid Wastes in South Central Oklahoma*. Unpublished MS Thesis, Oklahoma State University, Stillwater. 1972.

[7] Nourse, Hugh O. *Regional Economics*. (New York: McGraw-Hill, 1968).

STATE DEVELOPMENT PLANNING AND ITS RELATION TO SUB-STATE PLANNING

Gerald A. Doeksen*

A state comprehensive development plan is frequently a requirement for receiving federal grants. A recent study by the Council of State Governments [24, p. 9] summarized state plans as follows:

> "Most "state plans" called for by federal grants are not plans in accepted parlance; instead, they are assurances of state intent to comply with federally prescribed program specifications."

The inadequacies of state plans is blamed on the fact that comprehensive plans are not: (1) multiyear, and (2) are not products of a planning process.[1] Rather, plans are annual workplans prepared to assure that the state government meets the federal statutory and administrative requirements [24].

The fact remains that even though the plans are not adequate, each year more federal grants require a comprehensive state development plan. In 1969 for example, over 100 federal grant authorizations required state plans [24]. The objective of this paper is to illustrate how the planning process can be used in developing a dynamic state plan. The paper will be presented in three sections. First, the role of the state as a planning agency will be discussed. Second, a planning process will be outlined and illustrated using a study completed for the state of Oklahoma. Third, the relationship of the state plan to sub-state planning will be discussed.

THE STATE'S ROLE IN PLANNING

Much interest has been expressed concerning whether or not the state's role in planning should be increased or decreased. Results of recent surveys indicate that state governments are not well served by state planners and state planning agencies [6]. A specific criticism was that states neither viewed nor utilized the planning process in providing a rational basis for decision-making. An analysis conducted by Charles R. Adrian [1] concluded that some of the friction in the federal-state-local relationship arises because the states have been the slowest to professionalize their bureaucracy. Conflicts arise when the state's administrators do not have the same goals and values of other administrators. Another report by the American Institute of Planners Committee on Metropolitan Planning [3] suggested that federal aid should not be channeled through state agencies until the states have demonstrated a better understanding of local problems. Others have argued that the state's role in planning should be greatly expanded [2] [15] [25].

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*Agricultural Economist, Economic Development Division, Economic Research Service, U.S. Department of Agriculture.

[1] State plans are not the only comprehensive plans being criticized. Leven [15] reports on the unsuccessful attempts of metropolitan planning and comprehensive plans. Rural planning has likewise been classified as being unsuccessful by Hahn [6]. Also, several states have recently taken steps to include dynamic analysis and the planning processes in their comprehensive plans. Examples include [9] and [20].

Despite the criticisms and shortcomings of state plans and state planning agencies, the role of the state in planning has become the fastest growing segment of the federal-state-local relationship [14]. The role of state governments in planning is growing and probably will continue to grow due to two reasons. 1. The state government has certain legal powers. The state, by statute and constitution has legal authority for the very existence of local units of government and can determine and control taxation of its political subdivisions. 2. The state provides partial or total funding for such functions as health, safety, welfare, education and general well-being of its population. These two reasons exemplify why the state's role in planning has grown and present federal legislation indicates that it could become more important in the future.

In the past, state planning has taken on a connotation of being completed for the purpose of obtaining the federal "buck". Planning should be done to provide decision makers with information to solve important problems. Planning should be done to give perspective to problem solving and aimed at attaining the specified goals. Just because there is federal money for specified functions does not mean that state and local agencies should try to get it. Other activities may have higher state and local priorities. A well prepared state plan can help make these determinations. Adoption of the planning process will assist in developing a good state plan and will help in evaluating alternatives.

THE PLANNING PROCESS

The planning process is a procedure by which goals and objectives are determined, different alternatives are evaluated and decisions on action are made. In the literature, the planning process is outlined as containing three to five distinct steps.[2] The unequal number of steps is due to researchers defining various steps differently. The planning process discussed in this paper contains the following steps:

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[2] For example, Perloff [21] includes three steps: an information-analysis phase, a planning-programming phase and a planning operational phase. McLaughlin [18] includes five stages which are: 1. determining needs; 2. formulating goals; 3. determining courses of action;4. evaluating alternatives; and 5. implementing the program. A study [17] which was completed for Montana specifies five steps in its planning process and these are very similar to McLaughlin's. Another study [25] which discusses regional and district planning contains five steps in the planning process.

1. specifying goals;
2. evaluating alternatives; and
3. taking action.

Specifying Goals

In the first step, problem areas are identified by residents in the region or community. Then, goals and objectives are specified to attack or remedy the problems. They reflect underlying values, and should be obtained from the people. They should reflect where people are and what they desire, and not where someone thinks they are or ought to be. Goals are often general and specify the preferred patterns of ultimate actions of human beings. Objectives are used to supplement and clarify goals.

Evaluating Alternatives

Various analytical techniques exist to analyze and evaluate different courses of action for reaching specified objectives. Some of these include shift share analysis, economic base analysis, input-output models, econometric models, benefit-cost analysis, and simulation models.[3] The techniques are concerned with ways of exploring the future and measuring the impacts of alternative actions. This step in the planning process is to select analytical methods to evaluate the alternative means of reaching the goal specified in step one. It normally requires two parts. First, exact data needs are determined and the data are gathered for the information system. Second, the selected analytical technique or techniques are instigated. Finally, this step in the planning process uses the information analytical technique to project various economic variables[4] and to evaluate the specific objectives.

At this point in the planning process, the planner should evaluate each objective and select the desired course of action. If the evaluation does not yield means which achieve the goals as efficiently as desired, the goals, objectives, and means should be reevaluated. All possible policy variables should be evaluated in search of the actions which would most efficiently move towards the specified goals.

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[3] Hufschmidt [13] summarizes various analytical techniques used in planning. Also, Berry [5] presents several techniques which could be used for analyzing alternative actions.

[4] The importance and role of projections in planning is exemplified in Sonenblum and Stern [23].

Taking Action

The final step in the planning process is taking action based on the analysis conducted. In this step, the sequence of events must be arranged and public and private forces assembled to bring about realization of desired goals. The selected course of action should adequately spell out sequences and priorities, individual and group responsibilities, and funding responsibilities. The desired action should be carved out with maximum involvement of competent people. The progress of the course of action should be continually evaluated. The objectives should be reexamined to determine if the relationship between the actions and objectives is realistic and significant. If the objectives and action at some future date are not correlated, the plan will have to be revised.

AN EMPIRICAL ILLUSTRATION OF THE PLANNING PROCESS

State plans are criticized as not being multiyear and products of a planning process. To illustrate how the planning process can be used in decision making at the state level, an empirical study completed for Oklahoma is presented.

Specifying Goals

Among the many goals for the State is one goal which aims at increasing per capita income and reducing unemployment through industrialization. Objectives used to clarify this goal include:

(1) encouraging investment in industries with large short and long-run employment and income multipliers;

(2) encouraging investment in industries which create the most jobs per dollar invested; or

(3) encouraging investment in growth industries.

The policy makers must select the desired objective or objectives and employ various policy instruments to attain the desired goal. Some policy instruments available to policy makers for encouraging industrialization include providing state industrial development loans, tax breaks, and technical assistances.

Evaluating Alternatives

The technique selected for providing information concerning each alternative in the Oklahoma experience was the simulation model. This technique is useful for evaluating alternative means of reaching goals or objectives concerned with increasing industrialization in the state. Other techniques would be necessary to evaluate alternative means of obtaining other types of objectives; i.e., a better road system, better hospital system or a better education system.

The Oklahoma simulation model was formulated around the basic input-output system.[5] The Oklahoma economy was divided in 12 sectors. A sector is a group of similar type industries. The 12 sectors include agriculture, manufacturing, service and mining activities. Agricultural activities were divided into two sectors: crops, and livestock and livestock products. Manufacturing activities were divided into four sectors based on the economic activity in the state. Because of the large amount of agricultural production and mineral extraction in Oklahoma, separate sectors were included for agricultural processing and petroleum refining. This division permits an evaluation of the processing of raw materials produced in Oklahoma. The remaining manufacturing activities were classified into a machinery sector and other manufacturing sector. The service type activities of the economy were aggregated into five sectors; finance, insurance, and real estate; services; wholesale and retail trade; and construction.

Objective 1. To provide information concerning the first objective, short and long-run employment and income multipliers were obtained for the 12 sectors in the Oklahoma model. The procedure used to determine the short and long-run benefits from private investment was to assume a one million dollar investment in a particular sector in 1970. The impact of this investment was measured in terms of new employment and income created in 1970 and through 1980. Simulation runs were made for each sector to determine the impact each sector created.

Short and long-run employment and income multipliers are presented in Table 1. The multiplier effect indicates the relationship between some observed change in the economy and the amount of economic activity that this change creates throughout the economy. Listed in column (1) are the short-run employment multipliers. Each multiplier indicates the change in total employment generated throughout the Oklahoma economy by a one unit change in production employment in the specified sector. For example, if employment increases by 1 man-year in the machinery sector, the total change in employment is 2.02 man-years. Indirectly 1.02 jobs are created from the one man-year employment change in the machinery sector.

The petroleum sector has the largest short-run employment multiplier at 7.25. The magnitude results from the sector's large interaction with other sectors, particularly mining and manufacturing. Agricultural processing has the second largest employment multiplier at 6.29. Interpretation of the multiplier means that for each man-year directly employed in the agricultural processing sector for delivery to final demand, a total of 5.29 additional man-years are generated throughout the economy. The livestock and livestock products sector has the third largest multiplier, while the short-run employment multiplier of the construction sector ranks fourth.

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[5] For a complete explanation of the information system and simulation model, see [7]. The outline of the simulation model for Oklahoma is similar to one developed by Maki, Suttor, and Barnard [16]. Examples of other simulation studies for planning purposes include Swanson and Waldmann [23] and Hamilton and others [11].

TABLE 1

SHORT AND LONG-RUN EMPLOYMENT AND
INCOME MULTIPLIERS BY SECTOR
FOR OKLAHOMA, 1970

Sector	Short-Run Employment Multiplier (1)	Long-Run Employment Multiplier (2)	Short-Run Income Multiplier (3)	Long-Run Income Multiplier (4)
Livestock and Livestock Products	2.37	2.05	2.89	3.28
Crops	1.24	.72	1.49	1.10
Agricultural Processing	6.29	6.25	4.10	5.55
Petroleum Processing	7.25	6.25	5.27	5.78
Machinery	2.02	2.58	1.86	2.94
Other Manufacturing	1.37	3.13	1.79	3.78
Mining	2.12	2.10	1.87	2.02
Transportation, Communication and Public Utilities	1.54	1.66	1.42	1.41
Real Estate, Finance and Insurance	1.52	1.59	1.42	1.69
Services	1.30	1.62	1.32	1.99
Wholesale and Retail Trade	1.29	1.56	1.34	1.98
Construction	2.36	2.57	2.24	3.19

The long-run employment multipliers are presented in column (2) of Table 1. Each multiplier indicates the total employment generated in 1980 resulting from a one man-year change in employment in 1970. For example, if employment increases in petroleum processing by one man-year in 1970, a total of 6.25 jobs will be created by 1980. Agricultural processing, petroleum processing, and other manufacturing have the largest long-run employment multipliers at 6.25, 6.25, and 3.13 respectively.

An identical analysis was made with the simulation model to determine the impact on income of private investment in various industrial sectors. Listed in column (3) are the short-run income multipliers. Each multiplier indicates the change in income generated throughout the Oklahoma economy by a one unit change in income in the specified sector. For example, if income increases by one dollar in the agricultural processing sector, total income generated throughout the economy is $4.10. The petroleum processing sector has the largest short-run income multiplier at 5.27. The agricultural processing sector has the second largest short-run income multiplier at 4.10, while the income mutliplier for the livestock and livestock products sector ranks third. The long-run employment multipliers are presented in column (4) of Table 1. Each multiplier indicates the total income generated in 1980 resulting from a one unit increase in sector income in 1970. The petroleum processing sector has the largest long-run income multiplier at 5.78. In second order, is the multiplier of the agricultural processing sector. The multiplier indicates that for each dollars worth of income directly generated in that sector in 1970, a total of $5.50 will be generated throughout the economy in 1980. The long-run income multiplier of the other manufacturing is third largest, while the multiplier of the livestock and livestock products sector ranks fourth.

Objective 2. The second objective, short and long-run private investment cost per job created were determined for each sector.[6] The direct investment cost per 100 jobs created are presented in Table 2. The cost to directly employ 100 men is presented in column (1). For example, to directly employ 100 men in the agricultural processing sector, $1,282,000 (1963 prices) must be invested in that sector. The wholesale and retail trade sector has the lowest direct short-run investment requirements per 100 jobs. Following in second order is the service sector.

The direct investment costs per 100 jobs created directly and indirectly in the short-run by industry are presented in column (2) of Table 2. These costs indicate the direct investment needed in a particular sector to create jobs for 100 men. Jobs are directly created in the sector receiving the investment; however, employment created by the interaction of sectors is also included, thus all sectors may witness an increase in employment. For example, if $204,000 were invested in agricultural processing, 100 jobs would be created throughout the

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[6] For the exact procedure for calculation of cost per 100 jobs created, see [7].

TABLE 2

DIRECT SHORT, INTERMEDIATE, AND LONG-RUN INVESTMENT COST PER HUNDRED JOBS CREATED OKLAHOMA, 1970

Sector	Investment Cost Per 100 Jobs Directly Created in the Short-Run (1)	Investment Cost Per 100 Jobs Directly and Indirectly Created in the Short-Run (2)	Investment Cost Per 100 Jobs Created Directly, Indirectly and Induced in the Long-Run (3)
	(Thousands of Dollars in 1963 Prices)		
Livestock and Livestock Products	1,695	714	826
Crops	901	724	1,250
Agricultural Processing	1,282	204	205
Petroleum Processing	8,333	1,149	1,333
Machinery, Except Electrical	1,316	649	510
Other Manufacturing	1,219	654	389
Mining	3,125	1,471	1,492
Transportation, Communication and Public Utilities	4,167	2,703	2,500
Real Estate, Finance and Insurance	1,250	830	787
Services	452	347	279
Wholesale and Retail	443	344	283
Construction	658	279	256

economy in the short-run. The agricultural processing sector has the lowest short-run direct investment requirement per 100 men employed. Next in order are the construction, wholesale and retail trade and service sectors.

The investment cost per 100 jobs created in the long-run are presented in column (3) of Table 2. In the long-run, employment is increased directly, indirectly, and induced. Each figure in column (3) indicates the amount of direct investment required in 1970 to increase employment throughout the economy by 100 jobs in 1980. The agricultural processing sector requires $205,000 of direct investment in 1970 to create 100 jobs in 1980. Following this sector in order of increased investment costs are construction, services, and wholesale and retail trade.

Objective 3. Employment projections were used to provide information concerning the third objective (obtaining an indication of the employment growth potential of the industrial sectors). The favorable position of agricultural processing in terms of low direct investment cost per 100 jobs created in the short-and long-run has little relevance in attaining state development objectives if there is little potential for national growth in demand, or if Oklahoma is unable to capture increasing shares of the national market. To arrive at an idea of which sectors are expected to be national growth industries in the future, employment projections by sector from 1968 to 1980 published by the National Planning Association were used [19]. The employment change from 1968 to 1980 as well as the percent change during this period is presented in Table 3.

Table 3. Change in Employment and Percent Growth in Employment by Sector for the U. S. from 1968 to 1980.

Sector	Change in Employment from 1968 to 1980	Percent Change from 1968-1980
	(1)	(2)
Agriculture	-1,222,000	-34
Agricultural Processing	104,800	10
Petroleum Processing	-27,000	-14
Machinery	231,200	11
Other Manufacturing	1,953,000	11
Mining	-108,400	-17
Transportation, Communication, and Public Utilities	484,600	11
Real Estate, Finance, and Insurance	903,900	12
Services	5,419,300	14
Wholesale and Retail	1,286,300	10
Construction	781,100	11

Source: Carl N. Swanson and Raymond J. Waldmann [23].

Data in column (1) indicates that nationally, the greatest number of jobs is expected to be created in services, other manufacturing, and wholesale and retail sectors. Agriculture, mining, and petroleum processing are sectors which are projected to have a decrease in employment from 1968 to 1980.

The national projected growth rate for each sector from 1968 to 1980 are presented in column (2). The sectors with the largest percentage growth rates from 1968 to 1980 are services and real estate, finance and insurance. Employment in agricultural processing is expected to increase by 10 percent from 1968 to 1980, whereas machinery and other manufacturing employment are expected to increase 11 percent during the period.

Taking Action

The evaluation process conducted by the researcher needs to be presented to the policy maker. He in turn can select the action which he feels will most efficiently reach the state's goals.

In summary of the empirical illustration, it must be stressed that the planning process was broadly presented and a broad goal and three objectives were analyzed with a simulation model. The simulation model can be used to provide a dynamic analysis of the state economy and does fit into the planning process. Other objectives which simulation models could be used to analyze include:

1. assess the impact of different rates of growth in export industries' demand;
2. describe how different industry concentrations make the region more or less sensitive to business cycles;
3. determine the impact of various tax programs;
4. evaluate the impact of various government expenditure programs;
5. predict population and future labor needs (skilled and unskilled).

Additional research needs to be completed to provide state planning offices with techniques to use for evaluating various projects.

RELATIONSHIP OF STATE PLANNING TO SUB-STATE PLANNING

Just as state planners must accept national policy decisions as given, sub-state planners must accept state policy decisions as given. Local governments can do relatively little about raising income levels when the national government has all the important fiscal and monetary tools and the state governments have state policy tools at their disposal. Thus, local decisions are usually programmatic in nature, involving the efficient and equitable distribution of public services and financing burdens [12]. The local planner needs to know what the demand will be for sub-state public services and what will be the available revenues to finance such services.

Many analytical techniques available to the state planner are not useful or meaningful to local planners. Methods for evaluating alternative strategies available for local planners or policy makers need to be developed.

The relationship of state planning to sub-state planning can best be characterized as one of coordination. State planners would insure that sub-state plans are meeting or reaching toward state's goals. State planners should be making sure duplication is not occuring in various planning agencies and in planning at sub-state levels. State agencies should be directing state funds to those requests which have the highest priorities according to the state plan. The technical assistance and experts of the state staff should be available for local units. The increased technical responsibilities of the state should include increased education and training programs for their staffs as well as education and training programs for local officials and citizens. Economic planning is becoming increasingly important and increased effort and coordination at all levels of government is necessary to meet our nation's goals.

SUMMARY

The objective of this paper was to show how the planning process can be used in developing state development plans and aiding an evaluation of alternative strategies. It was accomplished by looking at the state's role in development, the planning process, and the states planning relationship to sub-state plans. Recent expenditures and attention allocated to the state, and future intentions illustrate that the state's role in planning is becoming increasingly important. The planning process was presented containing three steps which were: 1. specifying goals; 2. evaluating alternatives; 3. taking action. The planning process illustrates how goals can be specified and alternative strategies evaluated in order to supply the policy maker with information from which he can more intelligently make his decisions.

LITERATURE CITED

[1] Adrian, Charles R. "State and Local Government Participation in the Design and Administration of Intergovernmental Programs", *The Annals*, issue entitled Intergovernmental Relations in the United States, Vol. 359, May 1965.

[2] American Institute of Planners Committee on State Planning. "State Planning: Its Functions and Organization", *Journal of the American Institute of Planners*, November 1958, pp. 207-214.

[3] American Institute of Planners Committee on Metropolitan Planning. *Workshop Report*, *Proceedings of the 1964 Annual Conference* (Milwaukee: American Institute of Planners, February, 1965), p. 288.

[4] Barnard, Jerald R. *Design and Use of Social Accounting Systems in State Development Planning*, The Iowa of Iowa, Iowa City, 1967.

[5] Berry, Brian J. L. *Strategies, Models, and Economic Theories of Development in Rural Regions*, Agricultural Economics Report No. 127, Economic Research Service USDA, December 1967.

[6] Beyle, Thad L., Sureva Seligson, and Deil S. Wright. "New Directions in State Planning", *American Institute of Planners Journal*, Sept. 1969, Vol. XXXV, No. 5, pp. 334-339.

[7] Doeksen, Gerald A. *A Social Accounting System and Simulation Model Projecting Economic Variables and Analyzing the Structure of the Oklahoma Economy*. (Unpub. Ph.D. thesis, Oklahoma State University, 1971).

[8] Doeksen, Gerald A. and Dean F. Schreiner, *A State Economic Projection Model*. Oklahoma Agricultural Experiment Station Bulletin, B-693, May, 1971.

[9] Dyckman, John W. "State Development Planning: The California Case", *Journal of the American Institute of Planners*, May 1964, pp. 144-152.

[10] Hahn, Alan J. "Planning in Rural Areas", *American Institute of Planners Journal*, January 1969.

[11] Hamilton, H. R., S. E. Goldstone, J. W. Milliman, A. L. Pugh III, E. B. Roberts, and A. Zellner. *Systems Simulation for Regional Analysis, An Application to River-Basin Planning*, Cambridge: The M.I.T. Press, 1969.

[12] Hirsch, Werner Z. (1969), "Regional Information Design for Public Decisions", Institute of Government and Public Affairs, UCLA, MR-129.

[13] Hufschmidt, Maynard M. "A New Look at Regional Planning" in Book titled *Regional Planning, Challenge and Prospects*, Edited by Maynard M. Hufschmidt, Frederick A. Praeger, New York, 1969, pp. 28-42.

[14] Levin, Melvin R. *Community and Regional Planning*, Frederick A. Praeger, New York, 1969.

[15] Levin, Melvin R. "Planners and Metropolitan Planning", *American Institute of Planners Journal*, January 1967.

[16] Maki, Wilbur R., Richard E. Suttor and Jerald R. Barnard. *Simulation of Regional Product and Income with Emphasis on Iowa 1954-1974*, Agricultural and Home Economics Experiment Station Research Bulletin 548, Ames, Iowa, September, 1968.

[17] Montana State University, Bureau of Business and Economic Research. *State of Montana Planning Design Study*, July 1968.

[18] McLaughlin, Brian J. *Urban and Regional Planning: A Systems Approach*, Frederick A. Praeger, New York, 1969.

[19] National Planning Association. *State Economic and Demographic Projections*, Regional Economic Projection Series, Report No. 70-R-1, Washington, D. C., 1970.

[20] Office for Regional Development. *Change/ Challenge/ Response: A Development Policy for New York State*, Albany, N. Y., 1964.

[21] Perloff, Harvey S. "Statures of Regional Planning", *American Institute of Planners Journal*, March 1968, Vol. XXXIV, No. 2 pp. 153-159.

[22] Sonenblum, Sidney and Louis H. Stein. "The Use of Economic Projections in Planning", *Journal of the American Institute Planners*, Vol. 30, May 1964.

[23] Swanson, Carl V. and Raymond J. Waldmann. "A Simulation Model of Economic Growth Dynamics", *Journal of the American Institute of Planners*, Vol. XXXVI, No. 5, September 1970.

[24] The Council of State Governments. *State Planning and Federal Grants*, Public Administration Service, Chicago, 1969.

[25] U. S. Department of Agriculture. Economic Research Service, Economic Development Division, *Rural People in the American Economy*, Agricultural Economic Report No. 101, 1966.

[26] U. S. Department of Housing and Urban Development. *Comprehensive Planning Assistance in the Small Community*, March 1969, p. 83.

COMPREHENSIVE PLANNING AND ZONING AS A TOOL FOR RURAL DEVELOPMENT

Dean Barrett*

COMPREHENSIVE PLANNING

A comprehensive plan shows how a county can best use what it has, to become the kind of place it wants to be. It specifies how present and future improvements and uses of land and other natural resources should be related. It is a guide to both public and private development activities.

Comprehensive planning is the basic first part of the planning-zoning process. This process, long used by cities, is a major public way citizens can guide the growth of their community.

It may show, for example, how the county can help itself by capitalizing on its industrial potential. Or it may suggest how income-producing recreation, tourism, agriculture, or service-type enterprises can be developed.

In addition, the county that has a plan for its future development is looked on more favorably by industry and business seeking new locations. And often it can participate more effectively in State and Federal development of community-aid programs.

Planning for a county, like planning for an individual or a family, is nothing more than the wise use of resources. Experienced planners foresee future problems, needs, and objectives, and chart their courses years in advance.

A planning body--usually called a board--prepares the comprehensive plan.

The creation of a planning board that can function officially starts with State legislation. Such a board cannot be created unless the state legislature grants to the county government or to a regional planning agency the authority to undertake a planning program and to spend public funds for planning purposes.

Next is the establishment of the planning board in the way set forth by the law. The planning board should be able to get the views of a cross section of the population. If the members of the board do not themselves represent all major population segments--such as businessmen, farmers, housewives, and so on--the board should appoint and work closely with an advisory committee that is representative. The plan will work best if it is made and understood by the people who will be living with it.

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*Associate Professor and Extension Economist, Department of Agricultural Economics, Oklahoma State University.

Comprehensive planning is a three-step job. The steps are:

1. Deciding on overall goals.

2. Gathering facts about what the country has now--its resources, potentials, and problems.

3. Making a comprehensive plan that shows how the county can use what it has to achieve its goals.

This plan usually has three closely related parts, each of which is made up of numerous specific plans and proposals. Part 1 deals with social, economic, and civic improvements, part 2 with land use, and part 3 with use of natural resource.

Economic Base, Civic and Social Improvements

Any urban or rural community that intends to engage in comprehensive planning activities will need to assemble information relating to (1) existing improvements of all kinds; (2) the present economic base; (3) the people, their problems and goals; and (4) local government and finance.

Soil Resources; Their Use and Limitations

Accurate, up-to-date information on the kinds and amounts of soil, water, and related resources, their potential uses, and their needs for management and improvement must be compiled. Such data are needed by all persons, agencies, and groups responsible for programs affecting the use, conservation, and development of soil and water areas.

Present Land Use

Land use planning for the future necessarily must begin with the existing land use pattern. Planners will want to know what lands are used for homes, business, industry, farming, and so on. But how the land is now used may have little relationship to its inherent qualitative potential. Too often land resources are not developed in a way that will serve the best interests of the community. This may be the result of historic settlement or of economic forces or both. There may have been little concern for differences in the soils and for topography in relation to land use. Similarly, little regard may have been exercised in fitting a particular use to the lands, thus causing a waste of land that could be used or set aside for a higher or more desirable use.

Making Use of Natural Resource Plans

All resources, including renewable natural resources, should be considered when a comprehensive plan is prepared for a community. Factual information relating to such resources are pertinent in preparing both the urban and the rural aspects of the plan.

Economic, Civic, and Social Improvement Plans

A variety of plans for economic, civic, and social improvements are considered in four groupings. These groupings are (1) transportation and public services; (2) economic base; (3) educational, cultural, and housing facilities; and (4) government and finance. Many of the component plans in each grouping may not be needed in all communities. However, their inclusion here may provide a helpful reference and starting point.

Land Use Plans

Land use plans for the future must take into account the present land use pattern of the community, as well as the uses for which the different parts of the area are suitable. The first is shown with a map that is prepared to show present land uses. The second is determined after careful consideration of the community's resources, opportunities, problems, and planning objectives.

THE ROLE OF ZONING IN COMMUNITY PLANNING AND DEVELOPMENT

What is Rural Zoning?

Zoning in this country had its beginning in tiny colonial settlements along the Atlantic coast long before the Declaration of Independence was signed. The earliest zoning measures were simple. They consisted of regulations to keep gunpowder mills and storehouses to the outer edges of each settlement. These public safety measures were adopted as a result of frequent experience with explosions and fires at the powder mills.

Early zoning laws were passed in the interest of public health and safety. To separate dangerous and offensive activities from the rest of the community, a basic zoning tool, the "use" regulation, was used. These early communities thus exercised a limited degree of control over the uses that owners might make of their land.

Since early times, zoning tools of this kind have been used to attain many other community purposes. Land uses and activities that conflict are kept apart. Zoning ordinances of cities, towns, townships, and counties have created separate districts for homes, stores and factories.

Many counties have protected productive agricultural lands by enclosing fertile areas in farm zoning districts.

Building-tract (area) regulations, a second group of zoning tools, are used by many local governments to set lower limits on the size of building tracts. The question as to how large a building tract should be often arises. The proper size depends on location. In cities and villages where public water supplies and sewers are available, tracts may be small, but they must be large enough to assure adequate light, air, sunshine, and open spaces. In the open country, where wells and septic tanks are used, building tracts need to be larger for sanitary reasons. If a pig or two, a family cow, or chickens are kept, still more room is needed in the interest of public health and to reduce possible annoyance from offensive noises, odors, or flies.

A third zoning tool is the power to limit the height and size of buildings and structures. It is useful in crowded urban areas, but it is seldom used in the open country. The few communities in farm districts that use this tool make an exception for barns, silos, windmills and other farm structures, aside from the dwelling, from the regulations.

The last of the four basic kinds of zoning tools that are available to many communities is regulation of the "density of population." This zoning power may be used either to prevent overcrowding or to check a wasteful scattering of population. Overcrowding of the land may end in slums in the country as well as in the city. An unwise concentration of population may congest highways, overload existing water mains and sewers, and burden taxpayers with the cost of additional public facilities, including new roads and schools. Similarly, if it becomes necessary to provide a few isolated families with schools, roads, and other public services, high per capita costs to taxpayers may result.

Rural zoning, then, is the division of the community, by means of local laws called zoning ordinances, into suitable kinds of districts or zones for agriculture, residences, business, industry, and so on. Local laws are then applied in each kind of district to regulate (1) the use of land, buildings, and structures; (2) the size and coverage of building lots or tracts; (3) the height and size of buildings and structures; and (4) the density of population.

Zoning ordinances are an exercise by local units of government of the police power granted by the State--that is, the power to safeguard and promote public health, safety, morals, or the general welfare. Often a State's grant of zoning powers is spelled out in greater detail as follows:

For the purpose of promoting health, safety, morals, or the general welfare, the legislative body of (cities, counties, towns, or townships) is hereby empowered to regulate and restrict--

1) The height, number of stories, size of buildings and other structures;

2. The percentage of the lot that may be occupied, the size of yards, courts, and other open spaces
3. The density of population
4. The location and use of buildings, structures, and land for trade, industry, residence, or other purposes. To this list a number of States add: recreation, open space, agriculture, soil and water conservation, watershed, forestry, flood plain, or some of these.

Who Does the Zoning?

Zoning ordinances are local laws that are adopted by the local people themselves, either directly at special zoning elections, or indirectly by the legislative body of the community. The enacting procedure to be followed in your community is set forth in the same enabling act that granted your zoning powers.

Zoning tools thus work best in communities that have given serious thought to the future and have worked out a comprehensive plan of development based on a study of resources, problems, needs, and potentials. The idea is to achieve reasonable harmony of public plans for future investments in roads, water supplies, sewers, schools, parks, and so on, and for the private development of properties for residential, business, or industrial uses. The comprehensive plan is a blueprint that suggests how present and future improvements and land uses should be related. With a good comprehensive plan to provide guidelines, a community can use more wisely its zoning and related tools to assure that each new private development will be in reasonable accordance with and contribute to the overall harmonious growth of the local community. Most enabling acts specify that the zoning map and regulations shall be based on a comprehensive community plan.

Should Your County Zone?

The people of each county decide whether or not they want a zoning ordinance. The nature of the resources and the needs of the population influence this decision. Counties located close to expanding metropolitan areas and those that expect to grow in the future need zoning.

Zoning has generally been instituted by rapidly growing communities. It is closely associated with the progress of an area. Change from agricultural to residential, industrial, and commercial uses makes land use regulation necessary. Zoning provides the needed control.

Counties that want to develop recreational facilities or to control pollution of air and water supplies need zoning. In fact, zoning is so closely associated with growth that it can be ignored only by those areas that expect to remain undeveloped.

Advantages of Zoning--Planning and zoning have the following advantages:

1. The people in each area of the county can determine the uses they want to make of their land, the facilities they need, such as type of roads and water supply, and can cooperate in the orderly development of the area.

2. Objectionable uses can be excluded from further development in areas that are set aside for specific types of activity.

3. Buildings in residential areas can be made uniform as to type, size, height and style of architecture for the protection of property values.

4. Trash and garbage disposal places can be designated and "waste" areas (i.e. abandoned strip mining pits or stone quarries) can be used for these purposes.

5. Residential and industrial areas can be segregated to reduce traffic hazards and to control water and air pollution.

6. Under planning and zoning the builder of a residence knows that the area is set aside for that use.

7. Factory owners and merchants know that they are located in areas suitable for business purposes.

8. Areas of natural beauty can be preserved and their recreational potential enhanced.

9. Farmers are not affected by land use and building regulations. They do not apply to structures associated with operating the farm business. They can grow the crops they want and put up any size or type of structure they need for the opeartion of the farm business. A farmer who has a neat, well-kept farmstead is assured that a tavern or tar-paper shack will not be built next door.

Disadvantages of Zoning--Zoning has the following disadvantages:

1. A landowner may be forbidden the right to establish a specific type of business on his land if it does not conform with the zoning regulations.

2. Permits are required for construction of non-farm buildings.

3. Changes in the zoning ordinance may be made too frequently.

4. The provisions of the zoning ordinance may not be enforced properly.

Oklahoma County Planning and Zoning Law as Amended 1970

Section 865.51 County Planning Commission and County Board of Adjustment Authorized. For the purpose of cooperating with the State of Oklahoma in conserving the natural resources of the state, and in promoting the health, safety, peace and general welfare of the people of the state, there may be provided in any county of the State of Oklahoma county planning in the manner herein provided, and for that purpose there is hereby authorized to be created in each of such counties a county planning commission and a county board of adjustment with the respective powers and duties as set out in this act. In no county shall there be at the same time a county planning commission established pursuant to this section and a metropolitan area planning commission established pursuant to Section 966.1 of Title 19 and Section 863.2 of Title 19 of the Oklahoma Statutes. Provided that county commissioners may by proper resolution confer authority to any metropolitan area planning for unincorporated areas existing in county. Provided further that any county planning commission created under the provisions of this act shall have no jurisdiction over the area covered by any Lake Area Planning and Zoning Commission in any county created pursuant to Section 866.36 of Title 19 of the Oklahoma Statutes.

COMPREHENSIVE WATER AND SEWER PLANNING AND DEVELOPMENT OF RURAL WATER SYSTEMS IN OKLAHOMA

Leonard L. Downing*

In 1966 when the Farmers Home Administration was authorized a planning grant program for the completion of county-wide water and sewer plans, we had no precedent to follow. A comprehensive plan for rural areas had not been completed -- all plans completed at this time were solely for a town or a city. The state did not have adequate planning laws and had taken no action to promote a state-wide plan. Funds were not available for a state-wide plan.

We faced two major problems in the beginning:

(1) The professional planner in Oklahoma had given no thought to the development of a comprehensive plan for rural areas.

(2) The engineers had made no studies or considered the differences in design for rural water systems versus the urban systems.

The Farmers Home Administration proceeded to develop an area-wide comprehensive water and sewer plan that covered the entire county.

LEGISLATION RELATED TO PLANNING FOR WATER SYSTEMS

The Federal Government realized we had several agencies with overlapping authority to do comprehensive planning.

In 1968 the President designated the Bureau of the Budget to coordinate the actions of all the Federal agencies. The Bureau of the Budget issued Circular A-95 which provides for a network of state, regional and metropolitan clearinghouses to coordinate and review all federally assisted projects.

Oklahoma did not have any type of organization which could comply with the directive of the Federal Government. To correct this, in 1969 the legislature passed Senate Bill 290. This bill gave responsibility to the Industrial Development and Parks Commission to establish boundaries for planning regions within the state.

The Industrial Development and Parks Commission delineated 11 districts, and they have been designated by the Governor as sub-state planning districts. These districts serve as a coordination point for processing all applications for federal assistance and as a district clearinghouse.

The legislature subsequently created a new state agency known as the Office of Community Affairs and Planning. All of the services relating to community planning rendered by the Industrial Development and Parks Commission were transferred to the Office of Community Affairs and Planning. One of the main objectives of this agency is to prepare a state-wide comprehensive plan.

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*Chief of Community Programs, Farmers Home Administration, Stillwater.

In addition, there is now a new state law, S. B. 320, that provides for the creation of a county-wide planning commission and the development of a county-wide plan.

THE FARMERS HOME ADMINISTRATION WATER SYSTEM PROGRAM

One of the primary goals of the Farmers Home Administration is to assist and develop the rural community. As part of this, our agency makes several types of loans. One of these is the assistance available for central water systems.

Since 1963 the Farmers Home Administration has financed 325 water and sewer systems located in rural Oklahoma and towns less than 5,500 population. There are 270 of these systems in operation. Most are financed as Rural Water Districts, some are nonprofit corporations, and some are public trusts located in small towns.

In the beginning we had few guide lines to help us:

(1) In the early development, it was necessary to train and educate our people to work with groups instead of individual families.

(2) New engineering design criteria had to be developed. We had to build systems that were modest in design which the people could afford. The monthly water charges had to be reasonable.

(3) New, low cost materials had to be developed which resulted in the introduction of PVC plastic pipe for water lines.

This has been a very popular program, and we failed to estimate the public demand. Almost overnight, the program spread to all areas of the State.

This rapid growth has caused several problems:

(1) One most often called to our attention is that we failed to provide for sufficient growth. Most of the systems are requesting additional funds to serve more people.

(2) Due to lack of planning and development of sources of supply, we let too many small districts construct a system.

(3) We failed to make the Board of Directors aware of the responsibility of operating a public water system.

We are correcting many of these by financing needed improvements and by providing information on operating and maintenance to bookkeepers and managers. There is a possibility that we will consider combining several smaller districts into one large district.

Present planning criteria include designing systems for future growth and expansion where the community has a high growth potential. This requires attention to designing adequate storage.

Problems still confronting us include:

(1) Developing adequate sources of supply,

(2) Determining who will serve areas adjacent to urbanizing communities, and

(3) Serving areas close to towns or cities that have high growth potential.

What needs to be clearly determined is which agency will have responsibility for different communities so each community knows where to obtain assistance.

HOW DOES A COMMUNITY OBTAIN FINANCIAL ASSISTANCE FROM THE FARMERS HOME ADMINISTRATION?

The first inquiry can be made by an interested citizen or a group of interested people at the nearest county office of the Farmers Home Administration. We have offices in the 77 counties of Oklahoma.

If it appears that such a project is feasible, the people are advised to hire an engineer and request the engineer to prepare a preliminary engineering report. This report will give the estimated cost of the system, a rough design of the system, and the estimated water rate schedule.

The engineer's report is submitted to the Farmers Home Administration. We then complete an economic study based on people served, the proposed budget, and the plan of operation. If it appears that the system is sound from the engineering and economic standpoint, we issue a letter of conditions advising the applicants to proceed with the development of the project. If the applicants are not already a constituted public body, then steps should be taken to incorporate the rural water district or to obtain a certificate of incorporation if the applicants are a nonprofit corporation.

If funds are available for the project, the applicants are advised to have their engineer prepare the plans and specifications in detail and advertise for construction bids. When the construction bid is received and if it is within the funds available, the loan is closed, funds deposited in the construction account, and the contractor may proceed with the construction of the system. This procedure permits a great amount of flexibility and eliminates wasted effort in helping rural communities determine whether or not they can afford a community water system.

WHAT CAN BE DONE TO IMPORVE PLANNING FOR RURAL WATER SYSTEMS?

Multi-county area-wide comprehensive plans should be developed in order that small towns and rural areas might pool their resources in an efficient, logical manner, and rural communities might work together.

The people in a community must work together to promote rural development. A community water system is just one goal. They may need a central waste disposal system, community building, or recreation facility. All of these things will help close the gap between the rural and urban people and help to bring a more equitable distribution of opportunity. The job is far from being completed. We still have 223 communities in Oklahoma which have no central water systems. Of the 510 communities which have central water systems, 268 of them are inadequate since they do not serve all of the people.

COMMUNICATING PLANNING IDEAS

Ivan Hanson*

While community planning for development is not a new idea, the concept and procedures may be new to some communities. Our problem as change agents[1] is to help communities adopt these ideas with as little disruption as possible.

The process by which a new idea, such as planning for community development, is introduced into and adopted by a community is called diffusion. The purpose of this paper is to explain the diffusion process and apply it to the problems encountered in planning for community development. This will be done by: (1) explaining the concepts and steps in diffusion of an idea; (2) identifying some communication models used in disseminating information; and (3) developing some strategy guidelines to be used by change agents in establishing community development programs. Attempts will be made throughout to relate the classical concepts of diffusion theory to community development situations.

CONCEPTS AND STEPS IN DIFFUSION

The strategies for bringing about the adoption of an idea and the speed by which it is adopted depends on the type of decision process. Basically, there are authority decisions, individual decisions, and contingent decisions. The types of decisions differ in the following manner:

I. Authority decisions--the individual has no legitimate influence, but is ordered by others to adopt or reject. For example, command leaders in the military made a decision to adopt the M-16 weapon; and the infantry men had no choice but to use what was issued.

II. Individual decisions--the individual does have influence.

   A. Optional decisions--the individual has complete freedom to exercise his choice. The decision by individual farmers to plant hybrid seed corn is the classic example.

   B. Contingent decisions--the individual may or may not adopt an idea, but first the social system must make an adoption decision to make it available. For example, a teacher may or may not choose to use overhead projectors in the classroom, but first the school administrators must make the decision to buy some and have them available for the teacher's choice.

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*Associate Professor, Department of Agricultural Economics, Oklahoma State University.

[1] A change agent is a professional who influences innovation decisions in a direction deemed desirable by a change agency [8, p. 69].

III. Collective decisions--individuals in a social system adopt or reject by consensus, and all must conform to the system's decision. The classic example in this case is community decisions to flouridate water [9].

Community planning and development falls within the sphere of collective decisions, i.e., the community as a group must make the decision to establish a development committee or in some other way conduct development activities. All must conform to the system in the sense that tax revenues frequently are expended for these efforts or that community officials are empowered to speak and act for the group.

COLLECTIVE INNOVATION DECISION PROCESS

Collective innovation decisions are really a composite of individual decisions by many people. People must become aware of the new idea, increase their knowledge about it, be persuaded to try it, and then make the decision to adopt or reject. This process is normally viewed as taking place in several steps or stages, but they do not necessarily take place in discrete, sequential units. It is useful, however, to examine each of the steps in order to better understand how the process takes place and who is involved in guiding the process. A simplified paradigm of the collective innovation decision-making process is shown in Figure 1.

1. STIMULATION of interest in the need for the new idea (by stimulators)

↓

2. INITIATION of the new idea in the social system (by initiators)

↓

3. LEGITIMATION of the idea (by power-holders or legitimizers)

↓

4. DECISION to act (by members of the social system)

↓

5. ACTION or execution of the new idea

Figure 1. Paradigm of the Collective Innovation Decision-Making Process.

Source: [7].

Stimulation

Stimulation is awareness of the possibility for introducing a certain innovation into a social system. Often the stimulator is someone outside the social system, or a member of the system who is externally oriented (a cosmopolite). Cosmopoliteness is expressed by wide travel, readership of non-local publications, affiliation with national or international organizations, or by membership in professional occupations involving occasional migration, e.g. teacher, minister, salesman. Military service sometimes induces cosmopoliteness. Cosmopoliteness may also generate a favorable attitude toward change, a desire for new approaches not balanced by a vested interest in the status quo. Generally, the longer a person lives in a social system, the more inhibited he becomes as a stimulator.

In the field of planning for development, stimulators frequently are government officials, extension agents, university faculty, or planning consultants.

Initiation

Initiation is the stage where the new idea receives increased attention by members of the social system and becomes further adapted to the needs of the system. While the stimulator has suggested that planning may be needed by a community, the initiator is the person(s) who incorporates the idea into a specific plan of action that is acceptable within the social system's norms. The initiator is a localite, in contrast to the stimulator, who is a cosmopolite. The initiator will probably perform a role such as chairman of a development committee.

Legitimation

Legitimation is the approval or sanctioning of the innovation by those who informally represent the system's norms and who possess social power. They may somewhat modify the idea as presented to the community by the initiator, but their principal role is to screen new ideas for approval. Their roles generally are passive, giving approval, and they may not actively campaign for the innovation once the sanction is given.

If the legitimizers are consulted or involved in the decision-making process by the initiators, the probabilities that they will approve the idea are much greater, and the rate of adoption is faster. If the initiators try to ignore or circumvent the legitimizers, they may retaliate by killing the issue.

Research has shown that legitimizers have the following characteristics: higher income; higher education; higher social status; control more social resources such as wealth, formal position, influence over others, and knowledge; informal position in powerful friendship cliques; and highly credible decision-making reputation.

Legitimizers in the community development process have been known to be elected officials such as the mayor, but they may also be bankers or realtors. That is why most of you are now doing the study of the community power structure--to determine who the legitimizers are.

Decision

Members of the social system finally must act on the adoption of the innovation. This may be expressed through a survey, referendum, petitions, or public meetings. Acceptance of the innovation usually will be faster if the public has widespread participation in the choice process. In doing so, individuals acquire knowledge about the innovation and also learn how the group feels in relation to their own individual opinions.

In community development, it is very important to have community participation because they realize the decisions may have long run consequences for their community. In adopting a zoning ordinance, for example, individuals may feel very strongly about giving up some rights to the way they can use their property. However, if they participate in the process and come to interpret it as a social good, like speed laws and fire regulations, they may accept it more readily.

An Example of Innovation Stages

The stages of the collective innovation process and the roles played by people in each stage can be illustrated by the experience of one Wisconsin community. This particular case deals with the issue of water fluoridation, which is one form of a community development problem.

Stevens Point, Wisconsin, experienced a bitter battle in 1950 over the fluoridation of water to prevent tooth decay. Members of the American Legion Post started the stimulation process by sponsoring a forum on the subject and invited two outside experts as speakers. One was a Madison, Wisconsin, dentist, and the other was an assistant director of the State Hygiene Laboratory. These outside stimulators outlined results of their research on fluoridation and urged the community to join many other Wisconsin cities in adopting the idea.

During the meeting, an unofficial "watchdog of the public treasury" arose to ask the experts why they advocated "putting poison" in the water. This critic had a long history of taking stands on public issues. He had once been an unsuccessful candidate for lieutenant-governor and had served a long term as the city's clerk.

The initiation step occurred when a joint request to fluoridate the municipal water supply was made to the city council by the county dental society and the city board of health. The council rejected the idea as too experimental.

Legitimizers in the form of women's clubs launched a campaign to pressure the council into adopting fluoridation by presenting them with a petition signed by a thousand voters. The critic also appeared in opposition and demanded a referendum on the issue. The city council rejected his suggestion and voted to purchase the necessary equipment. The decision stage had been reached. All that remained was the action stage.

The day following the council's decision, the critic wrote a letter to the local paper acknowledging defeat and concluded that he was "getting too old to organize for a fight." This letter motivated two local men, a railroad repairman and a sewer pipe retailer, to rally to the critic's side. They secured the signatures of a thousand voters in favor of a referendum and forced the city council to put the issue on the ballot for the next city election.

In the meantime, the council proceeded with it's action phase and made plans for fluoridation. The plant actually began fluoridation of all drinking water on May 25, 1950 but did not make public announcement of the event for nearly a week. The action phase was completed except that the diffusion process also accounts for continuance or discontinuance of the innovation.

The three opponents began a massive letter-writing campaign to answer all arguments of the proponents. They accumulated discrediting material and sent a form letter to all deans of U.S. dental schools asking if fluoride was safe and if the treatment was out of the experimental stage. The opinions of certain cautious deans were used extensively, and attempts by the local newspaper to point out that the critics ignored favorable replies from deans was unsuccessful.

While the proponents mounted statistical evidence, the critics prepared signs with the words "Poison! Poison! Poison!" serving as the border for the phrase: "YES Gets the Poison Out of Our Drinking Water."

In September, the voters rescinded the council's action and stopped the fluoridation.

The citizens of Stevens Point went through the collective innovation decision-making process twice. The first time resulted in positive action, but the second cycle repealed that action. A new set of legitimizers appeared and forced a new decision and new action.

COMMUNICATION STRATEGIES FOR PLANNED CHANGE

One of the major problems of a change agent is to develop the appropriate set of strategies which will induce the desired response of the audience. Communications scholars have three principle models of communication strategies which can be examined--the hypodermic effect, the two-step flow, and the multi-step flow.

Communication Models

The hypodermic effect assumes that a message can be directed via mass media straight at a specifically defined audience. The mass media message is considered a stimulus that causes an immediate response. This model has been refuted on the basis that mass media alone cannot induce change, at best it creates a climate for change. This model assumes that you can by-pass the opinion leaders or legitimizers in the community, and that is known to have disastrous consequences. This model is a gross oversimplification which does not mirror reality.

In the two-step flow model, opinion leaders seek and get messages from the mass media which are passed on through inter-personal contacts to followers. The basic criticism of this model is that it does not tell us enough. Communication processes are very complicated, and to suggest that society is made up of two groups of people is too simplistic.

The multi-step flow model builds on the two-step and attempts to eradicate its weakness of simplicity. The multi-step flow suggests that society is made up of opinion givers and opinion seekers. There are, indeed, opinion leaders who seek information from the mass media and give it to someone else. Those who receive this information from the opinion leaders in turn become opinion givers to another group. In this way, society is seen as a network of dyadic (two-person) relationships. This is, perhaps, a closer approximation of communication networks in reality.

Use of Mass Media

All change agents involved in community development will inevitably look to mass media as a source of disseminating ideas. Mass media--radio, television, newspapers, periodicals, posters or signs--are ways of reaching audiences with messages. What do we know about the characteristics of mass media that will help us design a communication strategy?

1. Mass media serve mainly to increase factual knowledge about an issue;

2. Changes in attitudes are rarely a function of mass media. Usually they reinforce existing attitudes or change only those that are lightly held;

3. Public attention is focused on an issue. Mass media are more successful in telling people what to think about than what to think;

4. Mass media confer prestige or status on ideas, persons, and organizations;

5. Conflicting messages can create bewilderment and thus lessen interest or destroy attitudes; and

6. A large portion of the mass media is viewed as entertainment or escapism [4, 5].

In general, mass media operate directly on the level of information about an issue; the images of individuals, organizations, or projects; and the amount of attention directed toward an issue. Rarely are mass media responsible for changing fixed, long run attitudes.

Clelland has found in his research that mass media exposure raises the need achievement level of people, and Lerner has found that mass media exposure increases empathy [3]. Both need achievement and empathy are attributes important in developing a favorable attitude toward change. Thus mass media is viewed as an institution contributing, but not on specific details, to developing a favorable attitude toward change.

Commercial advertising is almost exclusively through the mass media and the Madison Avenue men (one form of change agents) use the same theory of media behavior as do educators. Cox has set forth several conditions which must be met for any audience to be influenced in the desired manner by communication:

1. The audience must, somehow, be exposed to the communication. The problem is that we know people engage in selective exposure, i.e., they tend to expose themselves to communications in which they are interested or find congenial to their existing attitudes and avoid communications that might be irritating, uninteresting, or incompatible with their opinions. For example, researchers have documented that only 32 percent of non-smokers consistently read articles dealing with smoking and lung cancer, while 60 percent of the non-smoking males read them.

2. Members of the audience must interpret or perceive correctly what action or attitude is desired of them by the communicator. People engaging in selective perception tend to misinterpret or distort the intended meaning of messages, usually in the direction to make it conform with their own attitudes, habits, or opinions. For example, persons shown a picture of a Red Cross truck carrying explosives, misinterpreted it as carrying medical supplies, "because that is the way it 'ought' to be".

3. The audience must remember or retain the gist of the message that the communicator is trying to get across. People can reduce their dissonance level by forgetting the message. Selective retention operates then to make people remember longer those messages that are comparable to their own attitudes.

4. Members of the audience must decide whether or not they will be influenced by the communication. Even when people have been exposed to a message, correctly perceived its intent, and remembered the main content, they still must decide whether or not to be influenced in the intended manner. *Selective decisions* occur because of the predispositions to act in a certain manner [2].

This information tells us that if we want to interest a community in a development project, that we can use the media to present facts about the project to the public, but that we have to engage in a concerted interpersonal communication campaign to convince people to change their attitude about it.

Interpersonal Communication

Interpersonal communication is word-of-mouth communication between two or more persons. It does not use print or electronic channels. It may be either verbal or non-verbal in form. One of the important advantages of interpersonal channels over mass media is that it facilitates feedback from receiver to the sender.

Some of the more important distinguishing characteristics of interpersonal channels compared with mass media channels are shown in Table 1.

Table 1. Communication Characteristics of Interpersonal and Mass Media Channels.

Communication Characteristic	Interpersonal Channels	Mass Media Channels
1. Direction of message flow	Two-way	One-way
2. Speed to a large audience	Slow	Rapid
3. Message accuracy to a large audience	Low[1/]	High
4. Ability to select receiver	High	Low
5. Ability to overcome selectivity process	High	Low
6. Amount of feedback	High	Low
7. Possible effect	Attitude Change	Increased Knowledge

[1/] This is because many rumors flow through interpersonal channels.

Source: [8, p. 125].

Interpersonal communication requires special attention to the relationship between the sender (change agent) and receiver (client). There are several variables which can be studied independently but must be viewed in reality as interaction dimensions. They are: reciprocity, homophily, empathy, and credibility [9].

Reciprocity

Reciprocity is essentially that the behaviors of each affect the other, both change agents and clients view their relationship as manipulative and reciprocal. For example, in a study of Boston's urban poor, change agents thought they were helping their clients learn middle class values, i.e., punctuality, respect for property and so on. Clients, on the other hand, felt they had control by not causing disturbances at settlement house youth parties and by providing the change agents with large work loads, which served as the agents' justification for further budgets and support, while at the same time they expected the agents not to tamper too much with their values. Each party had certain resources and activities that the other needed; each thought they were helping the other.

Homophily

Homophily is the degree to which pairs of individuals who interact are similar in certain attributes. Communication is more effective when a higher degree of homophily is present. Heterophily, the opposite of homophily, tends to inhibit interpersonal communication. The implication is that change agents should seek to reduce this heterophily in the messages they give to clients. This can be done by structuring the form and content of messages. Tell them information they can understand, absorb, and use. Use language they are comfortable with; don't try to impress them with you college vocabulary [1].

Empathy

Empathy is the ability to put yourself in someone else's shoes. A high degree of empathy on the part of the client, may overcome some of the heterophily gap problems. On the part of the change agent, he may have to empathize with the client, to see the impact of development form his point of view. The better the change agent does this, the more likely he is to be able to structure messages that the client will accept.

Credibility

Credibility is the degree to which a communication source or channel is perceived as trustworthy and competent by the receiver. Experiments have shown that when a client perceives the change agent as a highly credible source, he is more likely to be receptive to his messages. Agricultural extension agents, for example, are frequently selected from

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farm backgrounds because farmers perceive them as having higher credibility.

Both the mass media and interpersonal communication, as discussed above, are communication channels. And it has been shown that they have different characteristics and should be used for different purposes. Some of these characteristics and purposes are summarized in Table 2.

It shows, for example, that social relations are one form of interpersonal communicating agent or channel, that they serve functions such as social status, solidarity, mutual aid, response to ideas, and recreation. They are frequent, primary personal contacts, with the content of the messages exchanged in the contact oriented to local and personal experiences. Excellent two-way communication is one of the distinct advantages of interpersonal over mass media channels. Social relations assist in the decisions about adopting new ideas and in how to put them into effect.

STRATEGY GUIDELINES

Rogers has explicated several guidelines and criteria that can be set forth to aid in developing communication strategies for community development [8]. These guidelines are: cultural fit, client participation, client's evaluative ability, and opinion leaders.

Cultural fit--Programs are likely to be more successful if they are relatively compatible with existing cultural beliefs, attitudes, and values of clients. This is particularly true when dealing with sub-cultures. In northern Nigeria, for example, attempts to eradicate the tsetse fly in hopes of reducing the incidence of sleeping sickness were unsuccessful because peasants did not believe there was any connection. In some cultures in our country, it is difficult to persuade people to defer some of their wants, i.e., to not spend all their income on consumer goods for immediate gratification.

Client participation--Involving clients (targets) in the planning of change increases the likelihood of success. Such involvement (1) helps insure that clients' unique needs are considered in planning the change program; (2) increases client commitment to decisions which are made, as a result of their participation in the decision-making process; and (3) helps legitimize collective innovation decisions.

Clients' evaluative ability--The underlying strategy of every change agent should be the improvement of the clients' ability to seek information, to define alternatives, to evaluate these alternatives, and to take action to adopt or reject new ideas. Sometimes in the change agent's eagerness to get a program adopted, he may have sacrificed short-run gains for long-run abilities on the part of clients to meet new situations.

Opinion leaders--The time and energy of the change agent are scarce resources. By focusing his communication activities upon opinion leaders

Table 2. Major Functions and Structural Features of Some Communication Agents.

Type of Communicating Agent	Major Function	Structural & Operational Features	Major Expected Role With Respect to Others
Mass Media (Newspapers, magazines, journals, books, radio, and television).	-Providing information of widespread interest. -Selling advertising.	-Impersonal contact. -Frequent contact easily accessible. -Content of general interest. -One-way communication.	-First knowledge.
Social Relations (neighbors, friends, relatives, colleagues).	-Social Status -Solidarity -Mutual aid -Response -Recreation	-Personal contact. -Frequent contact usually incidental to primary group functions. -Content oriented to local and personal experiences. -Two-way communication.	-Help in decision-making. -Instruction in putting change into effect.
Specialized Agencies (experts, consultants, research & development, universities, Government).	-Disseminating information in specific topics. -Teaching basic principles. -Providing special and technical services.	-Personal and impersonal contact. -Contact limited to those seeking information. -Content of general and of specific & local interest. -Two-way communication.	-Instruction in putting change into effect. -Help in decision-making.
Commercial Sources (Industry, business firms, contractors, and private professionals).	-Buying & selling materials and equipment. -Professional services.	-Personal & impersonal contact. -Contact incidental to buying, selling, and special services. -Content oriented to economic & special interests. -Two-way communication.	-Instruction in putting change into effect. -Sometimes as first knowledge.

Source: [6, p. 24].

in a social system, you may increase the rate of diffusion. By using opinion leaders, you can increase the rate at which knowledge of an idea spreads, and get local sponsorship and sanction for your ideas. Do not, however, mistake innovators for opinion leaders. Innovators sometimes may be the first to adopt a new idea, but they may not have the respect of community followers, while opinion leaders are closer to the majority of the public. Be aware, also that there may be several groups of opinion leaders for different ethnic or income groups. The opinion leaders who may sanction a bond issue for a new street lighting system may not be the same opinion leaders who can foster a day care center.

Much of the research literature in communication, social psychology, and sociology that deals with strategies for change stresses the importance of homophily between the change agent and opinion leaders. A caveat should be sounded, which is a warning to all change agents not to identify so closely with the client that your attitude toward change disappears. The story is recounted frequently in communication literautre of the researcher who spent a long period of time studying Indians in southwestern United States who gave up his job and joined the Indian culture. A change agent is a professional hired by an agency to bring about a desired change. He has an orientation toward the future which is difficult to preserve when working with tightly knit communities that might be very traditional. It may be difficult to sustain that role, to trod the middle ground, but it is the essence of a change agent.

SUMMARY

There are three basic levels of innovation decisions. Authority decisions are made by a higher level, and the individual has no choice but to abide by its decision. Individual decisions are either optional or contingent. Optional decisions give the individual complete freedom to exercise choice. Contingent decisions require a higher level of decision first, but the individual is free to accept or reject it. Collective decisions are made by the social system and all members abide by it.

Innovation decisions about rural planning and development are most often collective innovation decisions. The steps in the collective decision process are: stimulation, initiation, legimation, decision, and action.

Three communication models are the hypodermic effect, which reaches a specific audience directly; the two-step flow where opinion leaders receive information from the mass media and relay it to others via interpersonal communication; and the multi-step flow, which is similar to the two-step flow except that it allows for many levels of opinion givers and seekers arrayed in a network.

Mass media serve mainly to increase factual knowledge about an issue and rarely is responsible for attitude change. Mass media also focus attention, confer prestige, relay conflicting messages, and provide entertainment.

Interpersonal communication is word-of-mouth communication between two or more persons. Variables influencing the effectiveness of interpersonal communication include reciprocity, homophily, empathy, and credibility.

Communication strategies for planned change involve fitting the program to the culture, involving clients in the planning of change, developing clients' evaluative ability, and identifying and utilizing opinion leaders for greater effectiveness.

LITERATURE CITED

[1] Berlo, David K., *The Process of Communication*, New York: Holt, Rinehart, and Winston, 1960.

[2] Cox, Donald F., "Clues for Advertising Strategies," *People, Society, and Mass Communications*, Lewis Dexter and David White, eds., New York: Free Press of Gelncoe, 1964.

[3] da Sola Pool, Ithiel, "The Mass Media and Their Interpersonal Social Functions in the Process of Modernization," People, Society, and Mass Communication, Lewis Dexter and David White, eds., New York: Free Press of Glencoe, 1964.

[4] Davison, W. Phillips, *International Political Communication*, New York: Frederick A. Praeger, 1965.

[5] Klapper, Joseph T., *The Effects of Mass Communication*, New York: Free Press of Glencoe, 1960.

[6] Quesada, Gustavo M., *Final Report on the Diffusion of Innovations Research Tradition*, Office of Research Analyses, Holloman Air Force Base, New Mexico, ORA-69-0016, November, 1969.

[7] Rogers, Everett M., "Communication and Collective Innovation--Decisions," Paper presented at the Water Pollution Control Federation, Dallas, October 5-10, 1969.

[8] Rogers, Everett M., *Modernization Among Peasants: The Impact of Communication*, New York: Holt, Rinehart and Winston, Inc., 1969.

[9] Rogers, Everett M. with F. Floyd Shoemaker, *Communication of Innovations: A Cross-Cultural Approach*, New York: Free Press of Glencoe, 1971.